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British Study of Industrial Fatigue

Experiments Which Seem to Prove Overtime to Be Uneconomic—Reduction of Hours Increases Workers' Efficiency and Total Output

UNDER instructions from the British Government, A. F. Stanley Kent, professor of physiology, University of Bristol, England, directed a study of industrial fatigue in seven factories over a period of more than two years. The second so-called interim report on this study covers two factories, one employing 2000 men and engaged principally in the manufacture of surgical dressings for the army in the field; the other manufacturing war materials, from turbines for large ships to steel shields used in the trenches, employing 600 men and many women. Of these employees a representative number were subjected to the fatigue experiments.

Certain definite results were obtained which promise greater industrial efficiency when the changes suggested are put into effect. It was found that the working of overtime leads usually not to an increase but to an actual diminution of output. Overtime proves to be economically extravagant. The shortening of the working day by 16½ per cent resulted in an absolute increase of over 5 per cent of the output, whereas a further reduction from a 10 to an 8-hr. day resulted in a total increase of 12.4 per cent in the remaining hours. Where it was desirable to keep machinery running continuously it was found better to introduce a fresh shift.

Professor Kent's definition of fatigue is: "A diminished efficiency of the organism occurring after labor, partly dependent upon it. The seat of fatigue is rather on the nervous than on the muscular side but it may be taken as an indication of the diminished supply of energy and less capacity for work."

Fatigue will be affected by labor, first according to its severity and second according to its duration. Tests were made before and after work as follows: At 5:40 a. m. night shifts were examined; at 6 a. m. occurred the first examination of the day shift; at 8:30 a. m. the office staff and any late workers; at 11:45 a. m. for recovery during dinner hour, the same workers being tested again at 1:30 p. m.; at 4:45 p. m. those who would go off duty at 5:30 p. m. together with those commencing the night shift; at 7:30 p. m. the over-time workers and at 9:35 p. m. those coming off at 10.

The experiments consisted of four tests: 1. Complex reaction time (letter and color tests). 2. The acuity of hearing. 3. The acuity of sight. 4. The systolic blood pressure.

The Experimental Tests

In the complex reaction time test, the examinee was required to depress a particular key which, at the same time that its movement was recorded on the moving drum, closed the circuit and caused a shutter to fall, thus exposing one of the series of letters, or, in the case of the color test, a particular color. On recognition of the letter or color exposed, the examinee selected from six keys in front of him the one bearing a similar letter or color to that exposed and depressed it. The result was a second mark on the drum. The difference between the two marks depend upon the time required by

the examinee to recognize the letter or color exposed, to select the appropriate key and to depress it. A chronograph marked in fractions of a second the time corresponding to this distance. In the letter test two separate readings were taken and the mean of the two selected.

To determine the acuity of hearing, a test was made to find the greatest distance at which the examinee could hear the tick of a watch. A meter rule was held behind the ear so that the zero was opposite the pinna, the distance being recorded when the examinee was just able to hear the sound. This required repeated tests, the watch sometimes being held behind the examiner's back as a control.

The test for acuity of sight was made by determining the greatest distance at which the examinee could identify letters of standard size stamped upon cards. The letters were arranged in different order to avoid error through familiarity with individual cards. The distances were measured by marking the floor at intervals of half inches.

In the systolic blood pressure test, Dr. H. French's sphygmomanometer was used, the apparatus being applied to the right arm which lay lightly on the table at the level of the heart. As a general rule it was found that the development of fatigue was accompanied by a rise in blood pressure.

Experiments were made by close observation and the actual reduction of time to determine the following points: The percentage of work time actually used; the effect of the reduction of hours from 12 to 10 to 8, as measured by the time used, and the actual and relative production resulting; the comparative efficiency of workers day by day; the effect of overtime on alternate and successive days; the effect of beginning the morning's work without breakfast; the efficiency gained by establishing a factory kitchen and pleasant lunch room; the peculiar inefficiency obtaining Monday morning and the increased efficiency on Saturday, when the afternoon is made a holiday.

The report is divided into three sections, the first dealing with fatigue as a result of overtime; the second with the influence of fatigue and of overtime on output; and the third dealing with food, the adjustment of application to the length of the working day and the maintenance of equilibrium between the development and the expenditure of energy, the attainment of maximum output, and the influence of overtime on the general health of the worker.

Fatigue as a Result of Overtime

A typical complex reaction time test begins with the usual peculiar Monday effect. The individual was less fatigued in the evening than in the morning, the test showing a difference of 0.86 second in the two periods. On Tuesday overtime was worked and a difference in the opposite direction was registered indicating a response in the morning quicker by 0.42 second than in the evening. Wednesday was another overtime

day and the evening value was 0.38 second longer than the morning value. No overtime was worked on Thursday and the difference between morning and evening values was only 0.01 second. The rest obtained Thursday night made Friday a more efficient day, overtime recording only 0.30 second longer than the morning. On Saturday, when work was stopped at 12 noon, the morning value was again greater than that obtained in the mid-day test.

Other tests showed that owing to the rest of 42 hours over the week end, Monday gave no indication of fatigue, although overtime was worked. A depreciation occurred Monday night and distinct evidences of fatigue were present on Tuesday and Wednesday, both overtime days, the visual acuity in the latter two cases showing a difference of 90 and 84 centimeters respectively. On Thursday no overtime was worked and the difference was reduced to 52 cm. On Friday, an overtime day, the difference rose to 112 cm., and on Saturday, a half day, although recovery was evident, it was imperfect. The effect of a half day at the end of the week, however, proved greater than the effect of a whole day in the middle of the week on Thursday.

Similar tests on members of the official staff demonstrated that extra hours impose a considerable strain on the power of those employed.

Individuals working overtime have an additional rest interval from 5:30 to 6 p. m., during which they are supplied with tea, cake, etc., free of cost. This half hour, however, is apparently of little recuperative value, since too much fatigue has accumulated to be dispelled in such a short time. The two following hours of work proved very inefficient and indicated that overtime labor is harmful to the worker and is physiologically extravagant.

Individual inquiries on the question of overtime resulted in 83 per cent of the workers voting against the extra period, the remaining showing indifference. As will be shown later, the actual decrease in production makes overtime, in addition, economically extravagant.

Temperature, ventilation, the presence of waste substance in the air, attention required and the noise and vibration from machines are other fatigue factors.

A study of shifts showed that a greater degree of fatigue developed on the night turn. Two factors are held largely responsible for this. Men working on night shifts are compelled to get their sleep in the day time which is by no means easy in the workman's home. In addition, the vital functions of the body are at their lowest in the early morning and a readjustment takes an appreciable time.

Power of recovery is determined by an individual physical development, state of health and nutrition, freedom from staleness and fatigue. Recovery is more difficult at the end of the day and of the week. A lengthened period, caused by the abolition of rest intervals, a lengthened day, resulting from the introduction of overtime, and a lengthened week, brought about by an interference of the week-end rest, will lead to a still more rapid production of fatigue and a still less perfect recovery. The distribution of overtime days greatly affects the result.

Influence of Fatigue and of Overtime on Output

Output varies according to, 1, the condition of the worker with regard to skill, health, freedom from fatigue, proper food and fitness, and, 2, the circumstances of the worker with regard to machinery, material, associated workers, weather, etc.

Output is lowest during the early morning and overtime periods. In the middle period of the day it is normally high, but is lowered by the working of overtime. This diminution is often so great that the total daily output is less when overtime is worked than when it is suspended. Thus, overtime defeats its own object.

On Monday the suspension of the early morning hours will as a rule lower output in the succeeding period. Tuesday will show the same result. On the remaining days a suspension of these hours is followed by an improvement in the output of the morning period. The change is due to restored co-ordination early in the week and of rest later on.

Psychical influences affect output. The output on

Saturdays, in spite of great fatigue, is often high owing to anticipation of the week-end rest. Experiment showed that a worker employed for 8 hours per day produced a greater output than when working 12 hours, the extra rest being more than sufficient to compensate for the loss of time.

One group of eight workers increased their average rate of output from 262 pieces to 276 pieces as a result of shortening the day from 12 to 10 hours, and to 316 on a further shortening to 8 hours. The earnings of a group of piece workers increased considerably as the result of the shortening of the day. This result was due to the elimination of the time lost by factory workers; in the case of the 12-hour day the loss approached an average of 10 per cent.

Effect of Food

Many operators are badly fed, due to insufficient salary and to the lack of adequate knowledge of food values. When provision of better food is possible through higher wages, the tendency to a vicious habit remains. Some 36.8 per cent of the workers had dyspepsia in varying degrees. In several cases workers producing far below the average were found to be doing without breakfast. When the number of hours was reduced and time was allowed for a properly cooked breakfast before leaving home, fatigue greatly diminished and the output increased 12.4 per cent. Women and children in particular are underfed because their dietary consists of too many delicacies and, therefore, of less substantial food.

The restaurant food which they were able to buy consisted largely of various kinds of fish surrounded with batter and fried in fat. The potatoes were cut up into chips and fried in fat also. It was found that this fat was often collected from houses or proved to be cotton-seed oil purchased in kegs. Fresh vegetables were almost entirely absent. This dietary resulted in defective nourishment and lessened energy.

Where it is impossible for workers to return home to their noon meal, it is suggested that a sort of kitchen and bright pleasant lunch room be provided. These rooms should be comfortably furnished and have cheerful views from the windows if possible. But this is not all. The workers have their own cliques and will not use arrangements, such as long tables, which prevent private conversation.

Energy Equilibrium and Balancing

The condition of an individual at the end of a period of labor will depend upon:

- 1—The original store of energy:
 - a—His physical development, health and fitness.
 - b—The character and duration of the previous labor.
 - c—The length of the previous rest.
 - d—The manner in which that rest has been employed.

2—The rate at which energy has been dissipated will depend upon:

- a—His physical development, health and fitness.
- b—The condition under which labor has been performed.
- c—The efficiency of the worker.
- d—The constancy with which the worker has applied himself to his task.

3—The rate at which energy has been regenerated will depend upon:

- a—The physique and the fitness of the worker.
- b—The supply of food and the manner in which it has been utilized.
- c—The number, length and character of the rest intervals.
- d—The constancy with which the worker has applied himself to his task.

e—The length of the period of labor.

Workers were kept under observation throughout the day to determine how greatly application will vary and how much time may be lost when the application is imperfect. Workers lost on an average from 14½ to 26½ per cent of the total time in the early morning and afternoon respectively.

Attainment of Maximum Output

The total output of a factory depends upon: 1. Work time (the official hours of the mill). 2. Nominal time (the average time during which the worker attends).

3. Actual time (the average time actually worked).
4. Actual rate (the average rate at which work is performed).

It follows that the attainment of maximum output is a matter of the accurate adjustment of the factors concerned based upon exhaustive investigations and patient experiments.

Influence of Overtime on Health of Workers

Where time lost was attributed to general health, the suspension of overtime resulted in a saving of 4½ per cent of the time. The subsequent suspension of the early morning hours was followed by a further diminution of the time lost during the day. The following tables show the amount of time lost in specific cases in 10 and 8-hr. days and in various periods during the day:

Total time worked out of a possible 10 hr. by two average individuals:

1—8 hr., 40 min.

2—7 hr., 26 min.

Total time worked out of a possible 8 hr.:

1—7 hr., 23 min.

2—7 hr., 24 min.

The percentage of time lost during different periods of the day:

Early morning (6 a. m. to 8 a. m.): 1—13.3 per cent; 2—33.3 per cent.

Morning (8:30 a. m. to 12:30 p. m.): 1—6.1 per cent; 2—8.75 per cent.

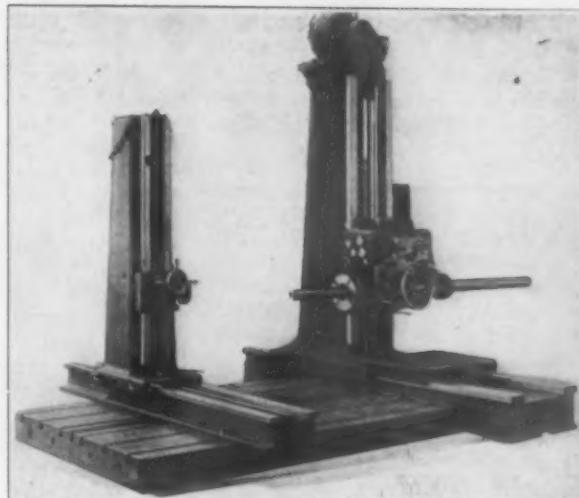
Afternoon (1:30 to 5:30 p. m.): 1—22.3 per cent; 2—38.7 per cent.

In the afternoon period there is a marked difference between the time lost by those who commenced in the early morning and by those beginning at 8:30 a. m., the former showing losses of 22.2 per cent and 38.7 per cent, the latter 11.7 and 6.6 per cent. A long day has resulted in a larger amount of time being lost.

Improved Floor Type Boring Machine

An improved floor type boring, milling and drilling machine is being built by the Landis Tool Company, Waynesboro, Pa. The construction is similar to the former Rochester boring machine, but includes a much simpler arrangement for controlling the feeds and speeds. It can be used to bore, mill, drill, tap and spline work, cut oil grooves, or do rotary planing at one setting, and if a swivel table is used it is possible to finish different sides of the work without resetting.

The machine is driven from a motor mounted on top of the column, which is directly connected to the main driving shaft. Friction cone clutches, located back of the saddle and accessible for adjustment, control the spindle drive and provide for a reversal of the spindle for back facing and tapping. This location of the spindle drive, it is pointed out, prevents spindle torsion and eliminates chatter when milling. The spindle



A Simplified Form of Control for Feeds and Speeds Is Employed in This Floor Type Boring, Milling and Drilling Machine

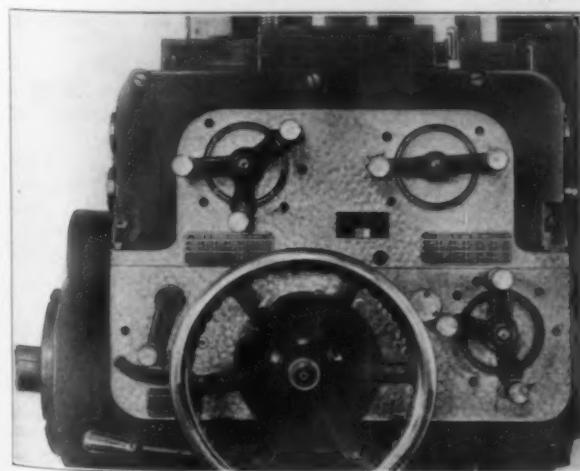
driving pinion meshes with a large-diameter gear cut directly on the face plate. The front end of the spindle slides through an adjustable bearing carried in the sleeve but the spindle does not rotate in this bearing, the rotating motion being taken in another adjustable bearing and on the external diameter of the spindle sleeve, an arrangement which is relied upon to give a take-up for wear on the sliding spindle bearing.

The concentric screw feed of the spindle, which is an exclusive feature in the machine, is sensitive and powerful and is accomplished by a differential train of gears. It is pointed out that the only factor limiting the length of the spindle feed when it is traversed in this way is that of practicability, there being no mechanical limit. It is possible also to traverse the spindle continuously without resetting by a long bronze nut, which engages a square thread on the spindle and has a bearing only on the sides of the thread. This arrangement, it is emphasized, provides a long bearing, and as the two rotate together at the same rate of speed, except when the feed is engaged, the possibility of wear is remote. An adjustment, however, is provided to take wear up should any occur. The feed is applied between the main bearings, thus eliminating an overhanging support at the end of the saddle. Ball bearings take up the end thrust in either direction, while the thrust on the spindle when milling is taken directly on the main saddle casting and is independent of the end thrust of the spindle for boring.

Provision is made for 12 speed changes and the same number of feed changes, all of the latter being at the same rate per revolution of the spindle whether applied to the spindle, saddle or column traverse. Provision is made to prevent any two from being engaged simultaneously. Any one of the 12 feeds can be applied to any one of the spindle speeds, thus giving in reality 144 actual feed rates. These changes are secured by manipulating the levers on the apron. Power rapid traverse independent of the regular feeds is provided for the spindle, saddle and column in every direction, and it is possible to start, stop or reverse the machine independently of the main drive or motor by a single lever.

The gear shifts are of the sliding transmission type and are inclosed to protect the operator, as well as adding to the life of the machine. The traversing gears are located between the ways and close to the guiding side in all cases.

A siphon system of oiling for the saddle parts is employed and is relied upon to give a continuous supply of clean oil to the bearings.



The Arrangement of Levers for Controlling Feeds and Speeds Has Been Reduced to Half That Formerly Used

The Century Coal & Coke Company, Ltd., Montreal, has been incorporated with a capital stock of \$500,000 by Charles Murphy, Harold Fisher, Stanley G. Metcalfe and others, all of Ottawa, Canada, to build and operate ovens for the manufacture of coke, etc.

A New Type of Speed Changing Device

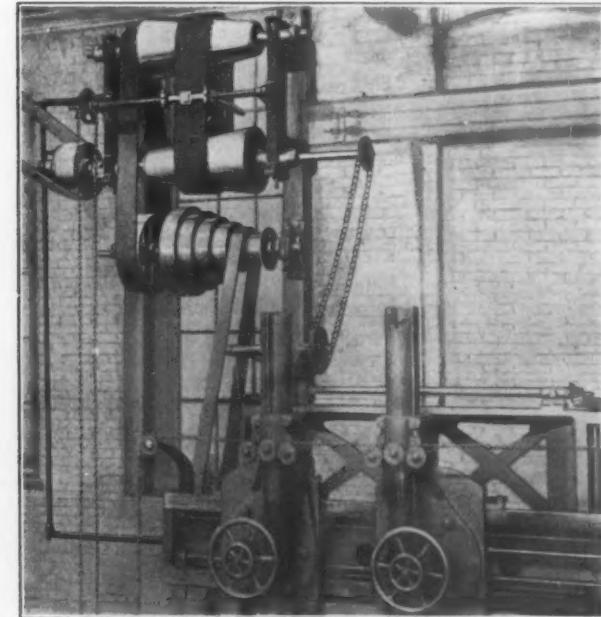
To provide a finer graduation in speeds than is possible with a cone pulley of the stepped type or a set of speed change gears, the Moore & White Company,

Philadelphia, has brought out a new speed changing device. Frictional slippage and the resultant loss of power are claimed to be eliminated, and a smoothly progressive variation in speed secured. Among the fields in which the device finds employment are lathes and boring mills, where, it is pointed out, a progressive speed change enables the correct cutting rate to be maintained despite a varying radius; in conveying a apparatus, where the material must be de-

The Tapered Leather Strips of the Transformer Serve to Build Up a Level Outer Surface, Over Which the Belt Runs, and Grip the Surface of the Cone Pulley Tightly

livered at a precise but variable rate of speed, and in numerous other applications where some particular set of conditions must be met by changing the speed.

The device consists essentially of a pair of cone pulleys, over which an ordinary leather belt runs, and a pair of the maker's cone pulley transformers, one on each cone. The function of the last is to build up the surfaces of the cones to true cylindrical forms where the belt runs over them, so that as far as the latter is concerned it might, it is explained, be running over a pair of ordinary crowned pulleys. The transformers are shifted along the cones by a screw actuated by a handwheel, or a chain, as shown in the accompanying halftone, the stepped cone pulley being used for extreme changes in the speed ratio only. While a transformer is in contact with a cone it runs exactly as if it formed part of the latter, the angle of the cone being such that there is no tendency to slip or creep



The Broad Belt at the Right Runs Over Two Endless Flexible Belts to Which Are Riveted Series of Tapering Leather Strips That Grip the Cone Pulleys. The Stepped Cone Pulley Provides for Any Unusual Ratios

endwise. The belt may be of any desired width up to the full width of the transformers.

The construction of the transformer is brought out clearly in the line drawing. It is a thin, flexible, endless belt, to which a series of tapering leather strips is riveted. These are sufficient in number to surround the large end of the cone and are shaped so that when wrapped over half of the cone they form a cylindrical outer surface. As each strip comes in contact with the cone it acts like a part of the latter until it lets go on the other side. In the drawing part of the band and some of the strips have been omitted to show the form of the inner surface. These strips travel at the speed of the band to which they are riveted, this being the same for all points on the outer surface of the strips. The taper of the cone, it is pointed out, is such that the friction of the strips holds them in place, and each point on the inner surface travels at the rate of that point on the cone with which it is in contact, just as if it were attached to it. In this way, it is explained, there is no tendency to slip or skew on the cone, and both the transformer and the belt may be as wide as desired.

These speed changers are built in vertical and horizontal countershaft types for use in connection with existing machines and can be supplied in sizes to transmit up to 200 hp. Different ratios of speed variation can be furnished. In addition to the vertical and horizontal countershaft types, the device is also supplied in connection with a constant-speed alternating-current electric motor to give variable speeds and one of the maker's friction clutches for starting under load.

Self-Aligning Ball Bearings

From a monograph prepared by H. N. Trumbull of the S K F Ball Bearing Company, Hartford, Conn., the following notes have been taken:

Exhaustive tests in manufacturing plants have demonstrated that transmission losses due to friction of plain bearings amounts to 20 to 40 per cent of the total power used. The starting friction in self-aligning ball bearings is no greater than that of running. As this makes it unnecessary to provide for a heavier starting load, it is possible to use a much smaller motor than would otherwise be the case. The rolling friction is practically uniform from rest up to very high speed in these bearings. Where hangers are equipped with self-aligning ball bearings the problem of selecting a motor for shop drives reduces itself to one of providing for normal machine power consumption only, without the heavy overload capacity usually required.

In addition to the saving in power and consequent lower first cost of the driving motor, there is also a considerable saving in lubricant. It is necessary to lubricate the double row self-aligning ball bearings only three or four times a year, the quantity supplied to each bearing at such times being considerably less than is generally given a babbitt bearing several times a month. This economy in lubrication results from the fact that the liberal size lubricant chamber around the bearing is sealed on both sides to retain the lubricant and protect the bearings from shop dust, grit, etc. The seal is such that the lubricant cannot leak out or creep along the shaft to the pulleys or belts, thus preserving the efficiency of the latter and adding to the general cleanliness of the plant.

Most shafting in plain babbitt bearings is run at speeds of 100 to 400 r.p.m., and if higher speeds are employed it is necessary to lubricate the bearings frequently to avoid hot boxes. It is possible to run self-aligning ball bearings at double or triple this speed, thus reducing the size of the pulleys if the same rim speed is desired or if the same pulleys are used narrower and lighter belts can be employed with the increased rim speed.

At the annual meeting of the Stanley Rule & Level Company, New Britain, Conn., the following officers were re-elected: A. W. Stanley, president; R. N. Peck, vice-president; C. B. Stanley, secretary and treasurer; C. W. Nichols, assistant secretary.

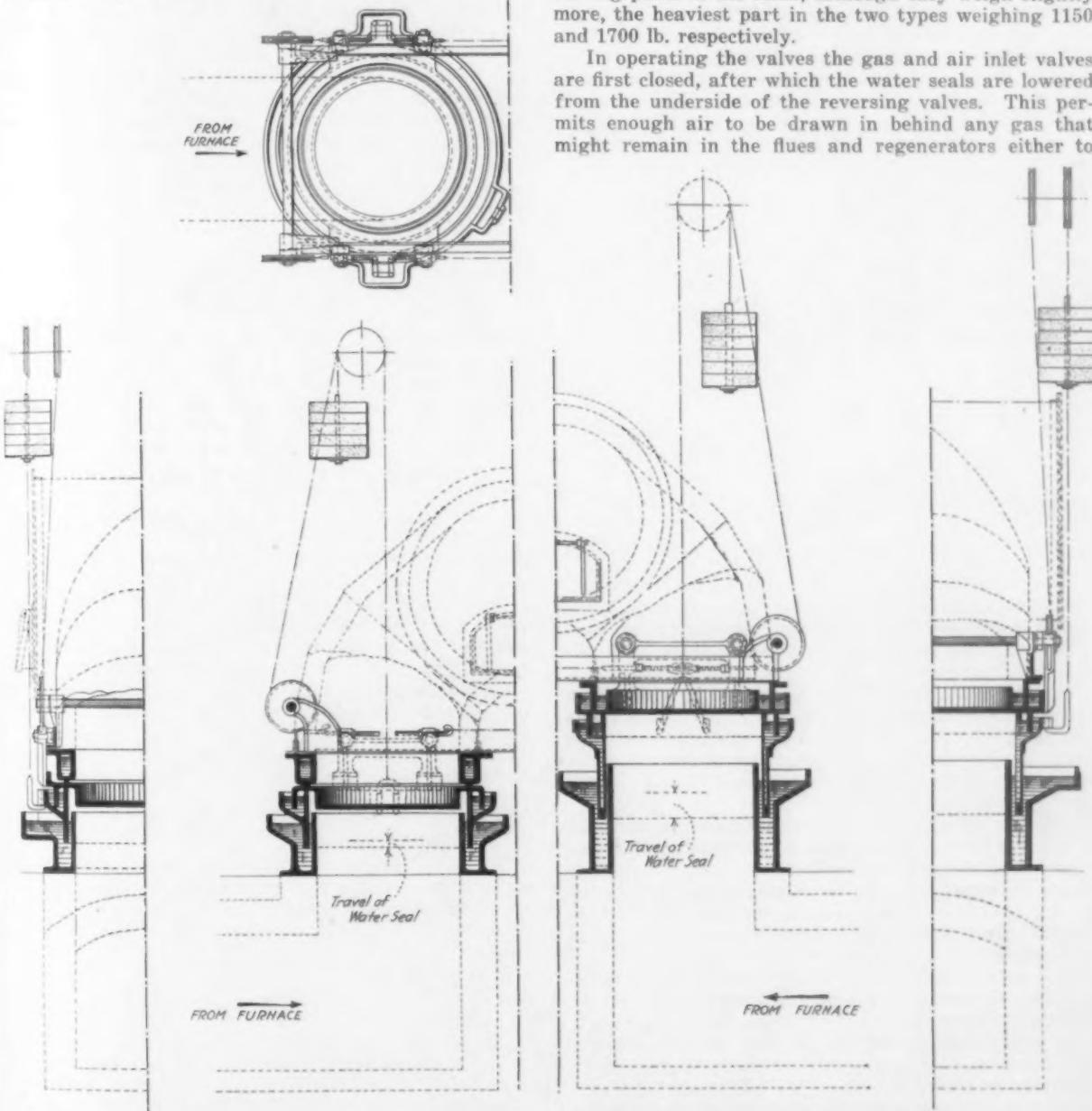
FURNACE REVERSING VALVE

Sliding Water-Sealed Construction Controlling the Gas Flues

J. I. Blount & Co., Birmingham, Ala., are marketing a new reversing valve that is being built by the Pennsylvania Engineering Works, New Castle, Pa. In addition to being used on open-hearth furnaces in connection with the ordinary gas and air inlet valves, the valve can be employed with waste-heat boilers, as the cycle of

The gate or valve proper is water sealed on the underside with a machined joint on the top. During the reversal of the gas flow, the water seals are lowered to clear the valve which is then drawn to the other flue. The angle guides for the valve are made slightly low, it is explained, so that when the seals are lowered the valve will drop enough to clear the seats as indicated and move freely. Where a water seal on both sides of the valve is desired, the type shown at the right is furnished. The principle of operation is identically the same as in the single-seal valve and the number of moving parts is the same, although they weigh slightly more, the heaviest part in the two types weighing 1150 and 1700 lb. respectively.

In operating the valves the gas and air inlet valves are first closed, after which the water seals are lowered from the underside of the reversing valves. This permits enough air to be drawn in behind any gas that might remain in the flues and regenerators either to



Half Sectional Elevation of Valve with Single Water Seal

Half Sectional Elevation of Valve with Double Water Seal

A REVERSING VALVE WHICH SLIDES ACROSS FROM ONE FLUE TO THE OTHER

operation can be varied practically as desired by simply changing the position of the cams on the main reversing shaft.

The valve consists essentially of a gate to be moved from across one flue to a corresponding position in the other flue, thus opening one flue while closing the other. The valve is made with either a single or a double water seal, half sectional elevations of the former being given at the left of the accompanying drawing, while the corresponding elevations of the double-seal type are presented at the right. The valve at the left is designed for use in connection with two flues leading to opposite sides of a furnace and with a top connection leading to a chimney. Two of these valves would be required for a furnace in connection with the ordinary gas and air inlet valves.

burn it there or drive it to the furnace where combustion takes place. The water seals of the other flues are next lowered and the valves are drawn across to the opposite flues, after which the water seals are raised and the gas and air inlet valves on the opposite side of the furnace opened. In this way, it is pointed out, both gas and air inlet valves are closed during the reversal, thus eliminating gas leaks at that time.

The particular cycle of reversal when once determined upon is fixed so that the operator cannot change it without varying the position of the cams on the main operating shaft. Both reversing valves and the gas and air inlet valves are operated by a single motor or cylinder driving the main reversing shaft, one revolution of which is sufficient to perform the entire cycle of operations.

The Cleaning of Blast Furnace Gas*

The Relative Advantages of the Hot-Dry and the Cold-Wet Methods of Removing Moisture and Dust

THE following advantages have been claimed for the cleaning of blast furnace gas by the cold-wet method: The greater portion of the contained moisture is removed, thereby saving some of the sensible heat of the gas, since water vapor has a high capacity for sensible heat and may carry from the exit passage of, say, a hot blast stove more heat units than are lost when the gas is cleaned. Also, the gas

in the stove exit gases for preheating the combustion air.

The total heat energy in a gas includes the heat which may be developed by combustion (chemical energy), the heat due to the temperature of the gas (sensible heat), and the latent heat of vaporization. The heat energy of combustion is a function of the composition of the gases, and can be readily calculated. The sensible heat energy depends upon the quantity, the volume and temperature, and the mean specific heat of the gas. The specific heat in turn depends upon the temperature of the gas and its chemical composition.

In the present discussion 1 lb. of a typical dry, clean top blast-furnace gas is taken as the unit, and it is assumed to have the following percentage composition by weight: CO_2 , 21 per cent; CO , 24 per cent; H_2 , 0.25 per cent; CH_4 , 0.25 per cent; N_2 , 54.50 per cent.

The presence of moisture, of dust and of excess air is measured in terms of the quantity of this foreign material per pound of such dry, clean top gas. The sensible heat energy of moist, top gas is, therefore, according to our method of calculation, the sensible heat energy of 1 lb. of dry top gas plus the heat energy of the moisture which accompanies and is in addition to 1 lb. of the gases which constitute the dry top gas; i.e., the heat energies are added together. The unit of moist, dusty gas is the weight of 1 cu. ft. of clean gas, plus the weight of the moisture and dust contained in it.

The length of the gas mains and connections need not be greatly increased and, furthermore, they may be insulated so as to conserve the heat energy of the gases. The 25 gr. of moisture per cubic foot of gas, mentioned above, remain in the gas, and are carried into the stoves and then out with the products of combustion. Assuming that the exit gases leave the hot-blast stoves at 600 deg. Fahr., with the hot-dry method of cleaning these gases will carry away 8.83 B.t.u. of

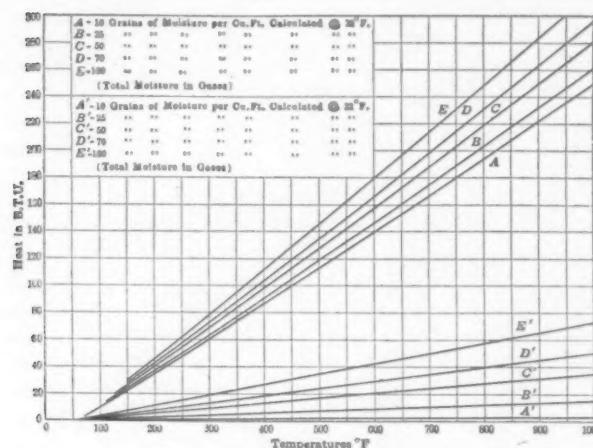


Fig. 1—Sensible Heat Carried Out by Moisture in Stove Exit Gases

being denser when cooled and free from moisture, burns more readily and has a higher calorific value than moist gas. Higher flame temperatures are also obtained.

On the other hand, it can be shown by calculation that the cold-wet process greatly reduces the sensible heat energy of blast furnace gases, which loss of heat energy is far greater than that lost from stoves or boilers due to the sensible heat capacity of the water vapor carried away by the exit gas.

The ideal cleaning process would be to remove the moisture without reducing the temperature of the gases. No process of this kind being available, if other things are equal, it is better to clean these gases hot and dry and leave the moisture in the gases than to cool the gases for the purpose of cleaning and of removing water.

The gain resulting from the conservation of the sensible heat energy of the gas entering the stoves permits of changes in practice that appear on the whole to be advantageous. By having hot gases enter the hot-blast stoves, it is possible to obtain higher flame temperatures in the stoves. This will result in a saving of coke in preparing the furnace charge, since a hotter blast will be obtainable in the same length of time with the consumption of the same quantity of dry top gas from the blast furnace. This hotter blast not only supplies additional heat energy, but it makes possible the attainment of higher temperatures within the furnace, and this in turn makes possible a reduction in the amount of coke charged.

Higher temperatures should make it possible to store up the same quantity of heat energy in the stoves in less time than is now required. By carefully cleaning the gases hot-dry and by thoroughly mixing with them the air for combustion a minimum of excess air is required. To further increase the flame temperature, it sometimes may be feasible to utilize the heat

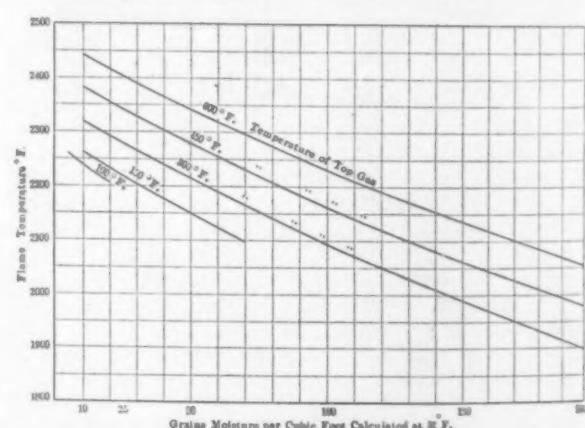


Fig. 2—Effect of Moisture in Furnace Top Gases on Flame Temperature

sensible heat energy for every pound of dry top gas over and above what the same gases would have carried out had they been cleaned by a cold-wet method, due to the greater amount of moisture left in the gas when cleaned by the hot-dry method. Let this energy be Q_e . The saving in sensible heat energy by the hot-dry method of cleaning as compared to the cold-wet method is:

$$Qt - Q_e = 174.6 - 8.83 = 165.86 \text{ B.t.u. per pound of dry top gas.}$$

Assuming a ton of iron to represent a production of 12,000 lb. of such typical top gas, a hot-dry method of cleaning the gases would conserve:

$$12,000(165.86) = 1,990,320 \text{ B.t.u. per ton of iron.}$$

*From a paper presented at the New York City meeting of the American Institute of Mining Engineers, Feb. 20, by Linn Bradley, H. D. Egbert and W. W. Strong. The authors are chief engineer, engineer in charge of the commercial department, and physicist, respectively, of the Research Corporation, New York.

In general, the sensible heat energy lost in cooling blast-furnace gas by a cold-wet method of cleaning is much greater than that carried out with products of combustion by the moisture left in the gases in a hot-dry method of cleaning. See Fig. 1. In *E* and *E'* the typical blast-furnace top gas has a moisture content of 100 gr. Curve *E* shows that if the top gas enters the wet cleaner at 300 deg. Fahr., it will lose 78 B.t.u. per pound of typical top gas when cooled to 60 deg. Fahr. Curve *E'* shows that if the same gas is burned without reduction of moisture content and the product of combustion leaves the stove at 1,000 deg. Fahr., the accompanying moisture will carry away 74 B.t.u. per pound of typical top gas. Even under these exceptional conditions, a hot-dry method of cleaning would result in a saving of 4 B.t.u. per pound of typical top gas. The measurement of the density of dust and moisture in a gas is, therefore, made by calculating how many grains of each gas would be contained by 1 cu. ft. of gas if reduced in temperature to 320 deg. Fahr. and a pressure of 760 mm. of mercury.

For combustion it is necessary to add a certain minimum weight of air per pound of clean, dry top gas. After combustion the chemical composition and the specific heats of the gases have been completely changed. The datum point is taken as 60 deg. Fahr., and the sensible heat energy of the exit stove gases will be the sum of the heat energies emitted by the products of combustion of 1 lb. of dry top gas, the specified excess air and the specified moisture when cooled from the specified temperature of the exit gases to 60 deg. Fahr. It is assumed, as in practice, that the moisture content of the exit gases is not great enough at any

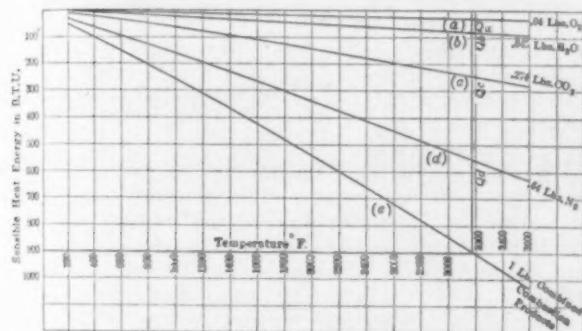


Fig. 4—Sensible Heat Energy Above 0 Deg. Fahr. in the Different Products of Combustion from Burning 1 Lb. of Typical Top Gas

time to condense any of the water vapor at the temperature at which the gases actually leave the stoves. The latent heat of the water vapor need not be considered because it is lost in any cleaning method which can be adopted.

Consider 1 lb. of dry, clean, top gas at 700 deg. Fahr., containing 20 gr. of dust and 25 gr. of moisture, both calculated per cubic foot of gas at 32 deg. Fahr. The unit of dusty, moist gas weighs 1.078736 lb. It is found that the sensible heat energy in the 1 lb. of top gas and in the moisture, which would be lost if the gas passed through a cold-wet cleaning apparatus reducing its temperature to 60 deg. Fahr., would be 174.69 B.t.u. = *Qt*. By the cold-wet method of cleaning the above *Qt* units of heat energy are lost for every pound of dry top gas, plus a specified moisture density.

In the dry-hot method of cleaning, no material lowering of temperature of the combustible gases for the stoves need take place. If blast-furnace gas enters a hot-blast stove at 900 deg. Fahr., curve *E* shows that on cold-wet cleaning 284 B.t.u. would be lost per pound of typical top gas. If the gas leaves the stove at 1,000 deg. Fahr., curve *E'* indicates that the moisture accompanying 1 lb. of typical top gas will carry away from the stove 74 B.t.u. In this case there will be a saving of 210 B.t.u. per pound of typical top gas. The other curves show results more favorable to the hot-dry method of cleaning, since the moisture contents are less. In practice the average moisture content seldom exceeds 35 gr. per standard cubic foot of typical top gas, even when the stock in the furnace has been watered to reduce dust losses.

The effect of moisture on flame temperatures is given in the curves in Fig. 2. The effect of increasing the moisture content from 10 gr. to 100 gr. would be to lower the flame temperature produced by burning the typical gas from 2,320 to 2,090 deg. Fahr., for the gas entering the burner at 300 deg. Fahr., and from 2,440 to 2,230 deg. Fahr., for the gas entering the burner at

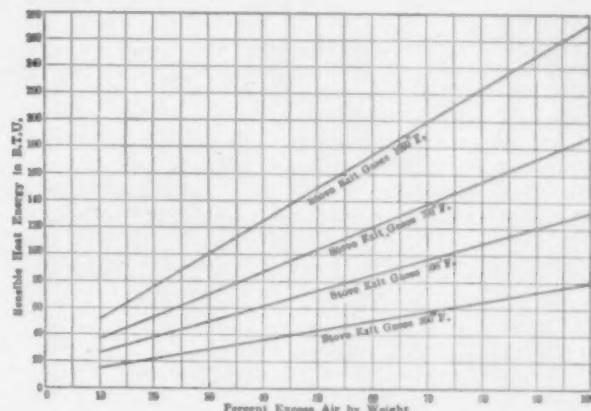


Fig. 3—Effect of Excess Air on Amount of Sensible Heat Energy Above 0 Deg. Fahr. Carried Away with Stove Exit Gases

600 deg. Fahr. If these gases had been cooled to 60 deg. Fahr. and the moisture thus reduced to 5 gr., the flame temperature would have been about 2,250 deg. Fahr. For a 50-gr. moisture content the cold-wet method would give a higher flame temperature if the top gases were originally at 300 deg. Fahr., whereas if they were at 450 deg. Fahr., or 600 deg. Fahr., or over, the hot-dry method of cleaning would give the higher flame temperature.

The effect of excess air in increasing the amount of sensible heat energy carried out from the stoves and boilers by the exit gases at different temperatures is given in the curves of Fig. 3. These curves assume a moisture content for the top gas of 35 gr. The relative loss of heat energy due to excess air increases as the temperature of the exit gases is increased. The curves show how very important it is to keep the excess air down to a minimum. Thorough mixing of air and gas, and having the mixed gases hot on entering the stoves and boilers, are important essentials, and some automatic device for regulating the air input for variations (due to furnace changes) in the quantity and composition of the blast-furnace top gases should be used.

The sensible heat energy in the constituents of the stove exit gases resulting from the burning of 1 lb. of dry top gas, carrying 35 gr. of moisture with 60 per cent excess air, the air carrying 5 gr. of moisture, is given in the curves of Fig. 4 for various temperatures of the exit gases. Although not plotted in that way, these curves could be made to show the sensible heat energy carried from the stoves and boilers by the moisture present in the original top gas and by the excess air. Such curves would give at various temperatures the loss of heat energy due to moisture and to excess air.

Fig. 5 shows the effect of excess air on flame temperatures. A range of excess air from 20 to 60 per cent lowers the flame temperature more than 300 deg. Fahr. As the amount of excess air is increased, the

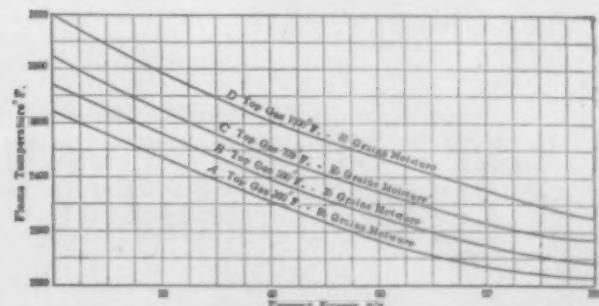


Fig. 5—Effect of Excess Air on Flame Temperatures

flame temperature depends less and less upon the temperature of the blast-furnace top gas. The great importance of reducing the amount of excess air, both as regards the conservation of sensible heat energy and the maintenance of a high flame temperature, is shown by these curves.

To sum up, the statement frequently made, that the cold-wet method of cleaning gases is advisable because moisture is removed from the top gases, thereby permitting higher flame temperatures and obtaining a decrease in the loss of sensible heat energy, is not true under the conditions of operation assumed in the paper, which are fairly typical and representative. Unless the gas has a moisture content exceeding 100 gr. per cubic foot, or its temperature is extremely low, sensible heat energy is conserved by using a hot-dry method of cleaning. The conservation of this sensible heat energy by a hot-dry method of cleaning also permits of a higher flame temperature, if the moisture content is not too high. The hot-dry method also makes it possible to operate with a minimum of excess air for combustion, this in turn promoting higher flame temperatures and conservation of gas.

Straightening Rolls for 16-Ft. Plates

The Hilles & Jones Company, Wilmington, Del., has recently completed a large set of plate straightening rolls. The distance between the housings is 210 in., which enables plates up to 192 in. in width to be handled. The rolls were built for the Lukens Steel Company and will be installed in the world's largest plate mill being constructed at the Lukens plant at Coatesville, Pa. The complete weight of the straightening rolls, including the electrical equipment employed for driving and adjusting, is 275,000 lb.

The rolls are 0.55 per cent carbon open-hearth steel forgings, having a finished diameter on the body of 16 in. They are arranged in two tiers having a clear opening of 6 in. between them. The upper tier has three rolls journaled in a single casting at each end, the bottom tier containing four rolls spaced to alternate with those in the upper one. The journal castings of the upper rolls are raised and lowered by four screws, two for each.

The main driving gear is keyed on one of the center rolls of the lower tier, the others being driven by pinions meshing with stationary idlers. These intermediate pinions are supported by two cast steel yokes in which the necks of the rolls turn, the idler pinions being keyed fast in the lower holes. This arrangement, it is pointed out, provides an independent vertical adjustment of 1 in. for the two end rolls in the lower group. Electric motor drive is employed throughout, the main driving motor being rated at 125 hp. A 20-hp. motor is employed for raising and lowering the top rolls and a 15-hp. unit provides for the adjustment of the two outside rolls of the lower tier.

This set of rolls will be installed at the end of a

runout table, 65 ft. long, over which the plates pass after being rolled. The straightening rolls are arranged for a plate travel of 50 ft. per min., and after being straightened the plates pass to the cooling tables.

Riveting Machine for Limited Spaces

The use of a removable lower stake or nose is the special feature characterizing the riveting machine for operation in limited spaces that has been brought out by the Vulcan Engineering Sales Company, Chicago. The machine is of the standard type of this company, which employs a combination of toggles, levers and guide links to provide first a toggle and then a lever action to set the rivet.

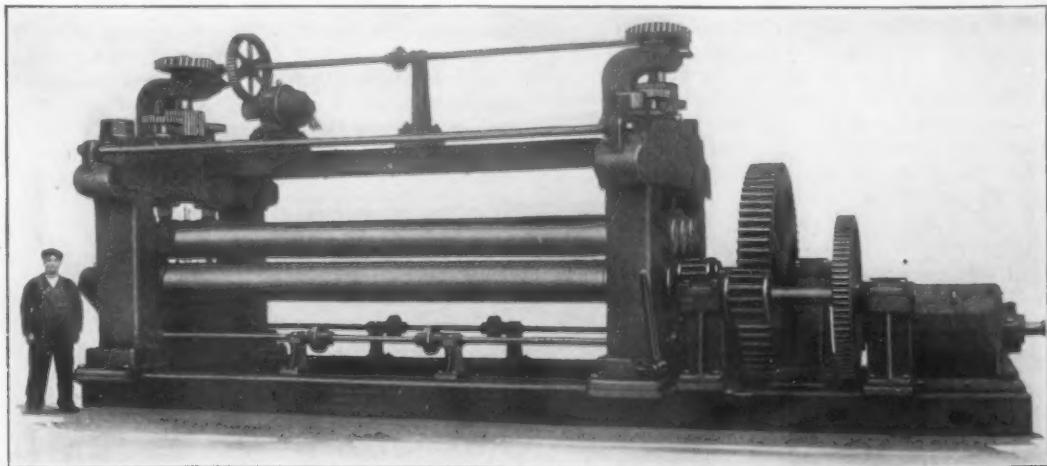
The lower stake or nose of the machine can be readily removed by loosening the set screw holding it in place. As it is possible to substitute other stakes shaped to any form of base adapted to the work that is being handled, it is pointed out that a wide variety of work can be done. As is the case with the other machines of this company, a combination of toggles, levers and guide links is used to give the large opening of the toggle joint movement with a gradual increase in the amount of pressure applied while the piston is traveling through the first half of its stroke. In this time the die covers the major portion of its movement.

When the desired pressure is secured the mechanism automatically changes from that of a toggle to that of a lever without a critical point, and approximately the maximum pressure is applied while the piston completes its stroke. The travel of the die during this time is relatively small, but at the same time, it is emphasized, is enough to eliminate uncertainty regarding the pressure applied to the rivet.

The department for scientific and industrial research which was established by the British Government on Jan. 1 has been given about £1,000,000 for its investigations.



The Lower Stake or Nose Is Removable in This Riveting Machine for Use in Limited Spaces and Can Be Shaped to Any Form Adapted to the Work That Is Being Handled.



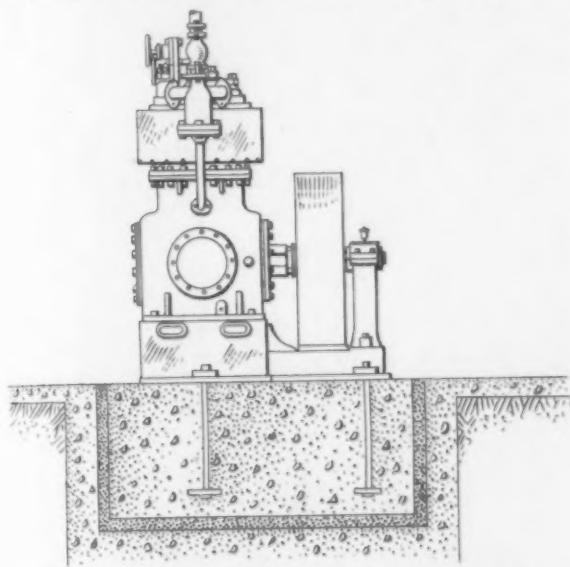
A Set of Plate Straightening Rolls Measuring 210 In. Between Housings and Handling Material up to 16 Ft. in Width

Reducing Machine Vibration and Noise

With a view to reducing as far as possible the noise and vibration incident to the operation of machinery in industrial plants, if not entirely eliminating them, the Armstrong Cork & Insulation Company, Pittsburgh, is marketing specially prepared sheets of corkboard. Among the uses for which the material is designed are the reduction in noise from air compressors, drop hammers, engines, motors, pumps, machine tools and drilling, forging and punching machines, etc.

The product, which is known as Nonpareil cork machinery insulation, is composed of pure granulated cork, pressed in metal molds and baked at a moderate temperature. The baking process, it is pointed out, brings out the natural waterproof gum or rosin of the cork and cements the granules firmly together, thus eliminating the use of any artificial binder. Each sheet is trimmed and sanded after baking to insure a uniform size and thickness. It is furnished in standard sheets of various thickness, densities and colors.

Two general methods of installation are followed. In the first the foundation pits are finished with concrete and lined with the corkboard on the bottom and



One Method of Reducing the Vibration and Noise Incident to the Operation of Machinery Is to Insert Sheets of Corkboard in the Foundation

sides, care being taken to protect the material with waterproof insulating paper. After this the foundation proper is poured in on top, the whole arrangement being shown in the accompanying drawing. The other method employs cork placed between the base of the machine and the foundation, floor or ceiling to which it is fastened. Where this arrangement is followed it is recommended that light telescoping metal pans be placed over the corkboard to protect it from abrasion and shield it from oil which might cause disintegration in time.

The material is made in densities ranging from 1.10 to 1.66 lb. per board ft., and is produced as boards 12 in. wide and 36 in. long, ranging in thickness from 1 to 6 in. The lighter material is used in connection with small fans, motors, generators, etc., while that of medium density is designed for installation with larger fans, motors and generators of medium size and light machines and machine tools, etc. The heaviest grade is intended for heavy motors and generators, large machines and machine tools, engines, etc.

With the imminence of the threatened commercial war as the argument, an informing letter is being generally distributed by Ellis F. Muther, general sales manager of the Gisholt Machine Company, Madison, Wis. The letter takes the form of a folder with a short message on the first page and some illustrations of concrete examples of rapid machining work printed on the second and third pages. It may carry suggestions to others in business-seeking methods.

CONSERVING FORGING DIES

Rapid Destruction of Dies Charged to the Forger

—A Simple Remedy

BY JOHN H. LLOYD*

DISCUSSIONS ofttimes develop among superintendents and other officials in drop forge concerns, relative to the limits and life of drop forge dies, owing to the fact that some impressions on them firecrack and play out much quicker than others. Where such dies have been made subject to a tempering process, some blame the difficulty on the man who tempered them, while others have a tendency to think they are of inferior grade or not as represented. If the truth were known, neither is at fault.

After a close study of this fault, covering a period of many months, I will endeavor to explain the cause and also suggest a remedy. To begin with, after being convinced that the dies have the necessary draft, smoothness of finish, etc., I find that it is usually the bottom die that becomes affected first. The difficulty generally lies, I contend, with the forger for allowing the forging to stick in the die during the period of hammering.

Let us stop for a moment and consider the position of the forger. Isn't it a fact that everything pertaining to the hammer is entirely at his mercy? Who sets the stroke? The forger. Who controls the lever? The forger. Who sets the dies and handles the forging? The forger. Thus he can either preserve or break them. In studying the motions of a drop forger, the movement of manipulating the forging while hammering to size is the most important. Ignorance as to knowing the right thing to do at the right time on the part of many so-called drop forgers has been the cause of ruining and breaking more dies than anything else. It only takes a few minutes to put out of commission a set of dies that is sometimes considered a masterpiece, upon which a die sinker may have worked several weeks to complete.

For the remedy, I would therefore suggest that all drop forgers, operating either board or steam drop hammers, should be instructed and compelled to lift the forging out of the impression to a height of 2 in., following every blow of the hammer. Such practice will: (1) Eliminate sticking and much firecracking. (2) The air will not only clear the scale away from the die, but will prove a tonic to the impressions. (3) The forger becomes more efficient in the art of drop forging. (4) Die cost, maintenance and breakage will be reduced 50 per cent. (5) The quality and quantity of production will prove highly satisfactory; and in the bargain, the problem of prolonging the life of dies to the limit of endurance has been solved.

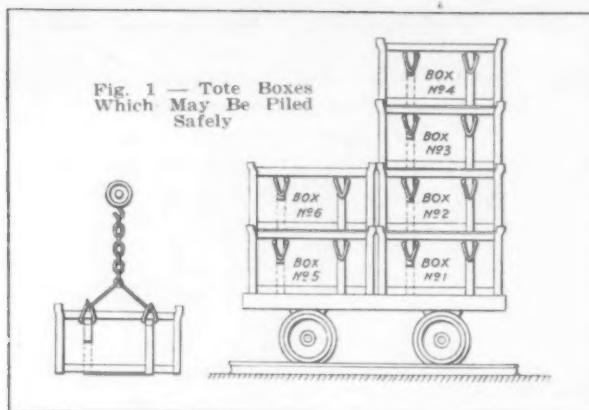
An Improved Type of Screw Anchor

The Diamond Expansion Bolt Company, 90 West Street, New York City, has placed on the market a new form of screw anchor, in which the maximum expansion is obtained where the greatest frictional contact occurs. The result is secured by changing the form of the interior bore of the anchor. Instead of uniform taper and the greatest frictional contact between anchor and wall being confined to a single narrow ring the minimum diameter of the bore is not at the end of the anchor but approximately at the middle, and from this point of minimum diameter the sides of the bore are parallel. This results in what is termed a parallel ultimate expansion which is claimed to increase the holding capacity from 30 to 80 per cent over the older type, according to the material to which the anchors are attached.



The Frictional Contact Between the Wall and a Recent Screw Anchor Is Distributed Over a Considerable Area at the Inner End of the Hole

*Superintendent, Rivetless Chain & Engineering Company, Avon, Pa.



HANDLING MATERIALS

Contrivances for Conveying and for Storing at Machines Work in Process of Manufacture

AS another contribution to industrial management literature, embodying the practice of Frederic Schreibman, who contributed in *THE IRON AGE* of Jan. 18 an article on "Relocating Equipment in a Machine Shop," the accompanying illustrations are presented to cover various tote boxes employed by him in his work as consulting industrial engineer and some contrivances for the temporary holding of material in process of manufacture or assembly. In *THE IRON AGE* of Feb. 8, as a part of these contributions were shown the plans of a forge shop before and after the machinery and equipment were relocated.

Fig. 1 shows a type of box which may be used for transporting relatively small products, either raw or in process of manufacture. It is provided with guides on top so that numbers of them may be piled one on another and accordingly may accom-



Fig. 2—Containers for Hot Metal Objects

modate a maximum volume of material with minimum floor space and thus utilize dead space of which there is usually considerable in the average plant. Thus placed they may be utilized as feed stations, so to speak, with the boxes containing material or tools or both for jobs ahead of a given machine. The illustration shows how the boxes may be lifted as by an overhead trolley and how they may be piled on an industrial car, which if provided, say, with ball bearings, may allow for moving heavy loads. Each box is also provided with a slot or pocket to hold a card containing the usual job information.

A modification of this box is shown in Fig. 2. Here the box is of flat metal bar construction to minimize weight over a solid metal plate box and to take care of small hot pieces in the forge shop. Another modification of the box shown in Fig. 1 is built of sheet metal but perforated so that it may

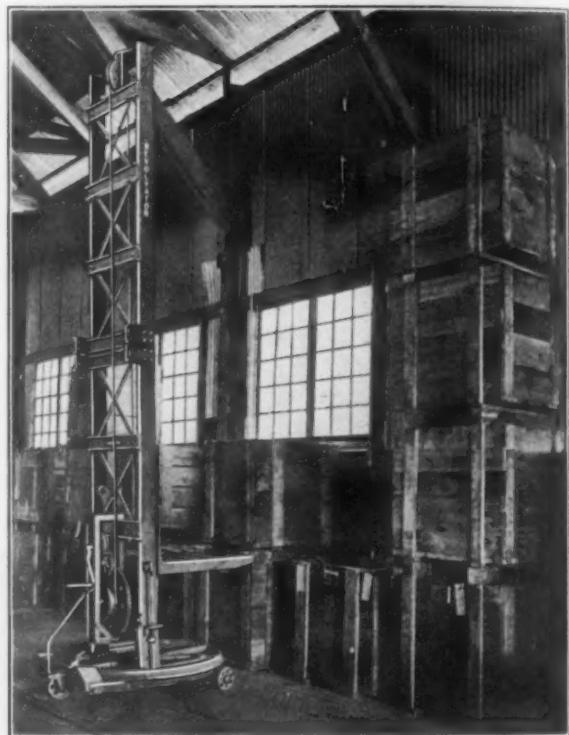


Fig. 3—Packing Boxes Utilized as Storage Boxes and Piled by the Portable Elevating Apparatus Shown

be used for dipping articles as in paint. The sheet metal is drilled full of holes and may be lowered by a hoist into the paint tank. With sheet metal the holes may be relatively large and closely spaced so that ready drainage is obtainable and the boxes utilized for toting purposes, as well as for dipping. In this connection Mr. Schreibman has designed an electromagnet as a part of the hoisting apparatus. The magnet is provided with a current interrupter to transmit vibrations to the box, and thus to stir or agitate the contents, although vibrations may be obtained through the use of compressed air or mechanically as through the use of a cam.

Fig. 3 shows the utilization of packing cases for the storage of parts in connection with an elevating piler, the use of which is indicated in the picture. The platform of the piler may be brought to the level of the box to be moved and the box lowered or lifted as the case may be.

Fig. 4 shows a form of box which will allow for handling long pieces, as in the forge shop. The top frame may be swung open to allow depositing long pieces in bulk as from a crane. Then the long pieces will extend in both directions beyond the box in a lengthwise direction and may be used for tem-

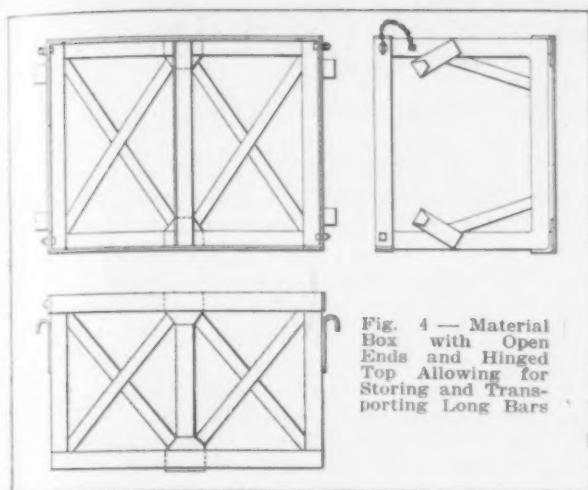


Fig. 4 — Material Box with Open Ends and Hinged Top Allowing for Storing and Transporting Long Bars

porary storage, as at a machine, so that one bar after another may be taken lengthwise from the box. The box is provided with ears so that it may be transported by means of chains from a crane and the boxes may also be piled one on the other so that they become available for use in an out-door or in-door steel storage, with one size or quality in one box and another size or quality in another. Similarly such boxes may be carried on industrial trucks and they may be piled on such a truck if necessary.

Fig. 5 shows racks for storing tools and dies, various sizes being available for piling after the manner of sectional bookcases. The back may be hinged and fitted with a wire mesh and the contents protected also under lock and key. There are no dark places and the contents of each rack is therefore under ready observation. The use of the racks comprehends placing a group, for example, near machines needing certain dies, jigs or fixtures together with a card in the slot of each rack covering the job for which these devices are to be used. The use of the racks is intended also to give a foreman the opportunity for inspecting dies, tools, etc., so that if repairs are necessary they may be attended to at once and locked in the racks. As the rack is transportable it may be used in available places as long as these are not needed for other purposes. If desired to pile such racks to considerable heights they may be bolted together.

Fig. 6 shows the front of a movable bin containing material for a definite assembly. The proper number of pieces are provided for the lot and the scheme is that thus neither an excess nor a deficiency of material is supplied. The shelves are provided with shallow front guards so that small pieces or parts will not fall out. The object of the movable bin is in short to give the exact number of pieces for the assembly of a definite number of products, in this case a given number of cars. The plan

provides for preparing for the assembly several days in advance, and avoids arguments and loss of time in claims that the stores keeper has not supplied sufficient quantities or that the workmen have spoiled and thrown away different parts. It also gives the workmen a chance to know exactly where different pieces are and they are not required to stoop in selecting the pieces.

Customs Decisions

Tant Iron Not Dutiable

Tant iron, when imported in the form of pig iron, is properly free of duty under the present tariff, under the specific provision for "iron in pigs" is the conclusion reached by the United States Court of Customs Appeals in a test case brought by the Bethlehem Foundry & Machine Company. The collector had classified the commodity as ferrosilicon, calling for duty at the rate of 15 per cent. The Board of General Appraisers found in favor of the importer. The Government then appealed to the court. It was shown at the trial that,

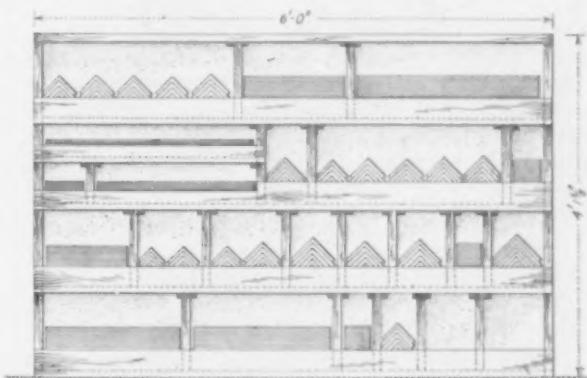


Fig. 6—Movable Bins for Parts for Assembly of a Given Size Lot

whereas ordinary pig iron contained around 4 per cent of silicon, the tant iron in controversy had as much as 14 per cent, and is used for making acid-resisting containers used in the manufacture of nitric and sulphuric acids and other chemicals.

Judge Martin, in his decision for the court affirming the board, and thereby sustaining the importer, said the evidence showed that the metal was not ferrosilicon, but essentially differed from it in character and use. The court remarked that pig iron was met with in the trade occasionally with a percentage of silicon as high as 16 per cent. It was accordingly held that, while the merchandise in controversy differed to some extent from the average pig iron of commerce in respect to the proportion of silicon it contained, it was, despite this fact, properly free under the pig-iron paragraph.

Shell Grinders Are Machine Tools

Shell grinders were imported from Canada at the ports of Buffalo and St. Albans, Vt., by C. J. Tower and P. McGettrick for the account of the Ford-Smith Machine Company. The collectors at the ports named classified the grinders as "manufactures of metal not specially provided for," and took duty at the rate of 20 per cent. The contention of the importers, sustained by evidence, was that entry should have been given at 15 per cent under the provision in the present tariff for "machine tools." Judge Fischer held the grinders had been shown conclusively to be "machine tools" within the generally accepted and tariff sense of the term. The protest was sustained and the customs officials reversed.

The Bethlehem Steel Company has purchased the limestone quarries of the New Jersey Lime Company at McAfee and Hamburg, Sussex County, N. J., in Chancery proceedings for a consideration of \$72,838. The properties adjoin the present quarry of the Bethlehem Company at McAfee Valley.

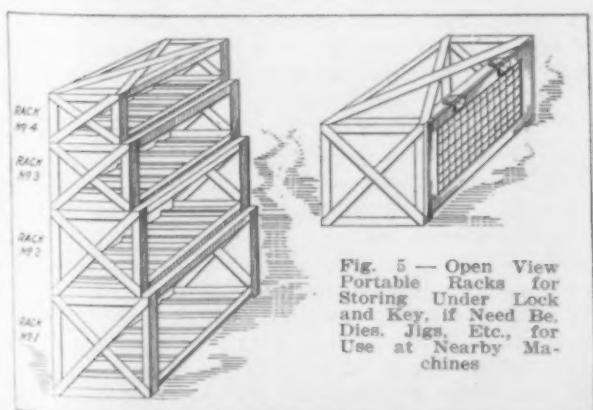


Fig. 5 — Open View Portable Racks for Storing Under Lock and Key, if Need Be. Dies, Jigs, Etc., for Use at Nearby Machines

The Mechanical Testing of Cast Iron

New Device to Determine Hardness— Objections to the Brinell Test—Strong Irons Necessary to Obtain Big Deflection

THE testing of cast iron mechanically was discussed by F. J. Cook before the South Staffordshire Iron and Steel Institute (British) at a recent meeting. The two principal points touched on in the paper, "Mechanical Tests of Cast Iron," were tests usually called for by engineers' specifications and those adopted as a guide to efficient working in the foundry.

Anyone looking into the tests usually included in engineers' specifications, who is at all familiar with the metallurgy of cast iron, said the author, cannot fail to be struck with the fact that they are so carelessly framed as to be of no practical value. The tests called for by specifications are generally mechanical, but occasionally they are chemical. For instance, in a specification issued not long ago, for a 13-hp. high-speed engine, the only reference to the quality of the iron to be employed was that "no cast iron used in the engine should contain more than 0.5 per cent of phosphorus."

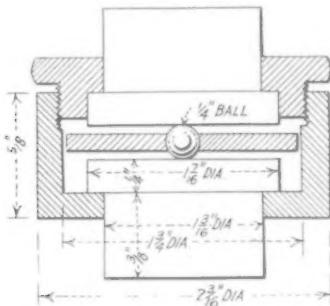


Fig. 1—Diagram of New Device to Determine Hardness Showing Section of the Container with the Two Test Pieces and the Test Ball in Position

Certain makers in sending in their quotation said that this quantity of phosphorus was not in accordance with their usual practice, but they expressed their willingness to submit their metal to any reasonable mechanical tests. The engineer, however, was adamant, and so the order went past them.

The question of test specifications for cast iron in Great Britain is in a state of chaos, and the time is ripe for the drawing up of standard rules which shall at least have the result of making tests practiced in various works comparative. Good work in this direction has already been done in America. There can be no two opinions regarding the benefits to be derived from a regular series of tests intelligently carried out. The results not only give a greater confidence in what is being done but lead often to much more economical working.

One of the causes which have militated against a wider application of testing in the foundry has undoubtedly been the great cost required to install the necessary machinery, a hydraulic tensile machine with its foundation, accumulator and pumps, transverse and hardness machines with proper house to accommodate them, making up a first cost bill which is generally considered prohibitive, besides which the machines generally require more than usual care in manipulation.

Engineers who have no knowledge of the founders' difficulties are apt to dub the members of the trade as non-progressive. But the tests em-

ployed show that some progress and effort is being made to meet the ever-increasing exactions of engineering science. If engineers in general and draftsmen in particular would strive to know something of even the laws of crystallization, much better results could often be obtained with infinitely more economy and less anxiety to the foundryman.

Some of the other important points brought out by the author were as follows:

Keep's Shrinkage and Other Tests

The important tests which are of use as a guide to foundrymen are:

Keep's tests, shrinkage, deflection and transverse. Hardness test. Casting temperature or fluidity test. Measurement of volume and pressure of cupola blast. Impact test.

Keep's test, as is now generally known, consists in casting $\frac{1}{2}$ -in. square bars between iron yokes, the ends of which are 12 in. apart. When the bars have cooled down the shrinkage is shown by the difference between the length of the bars and the gap in the yoke in which they were cast; this is usually measured by inserting a taper graduated wedge in the gap and measuring off the dimension of the space. This operation necessitates the bringing of the pattern plate yokes and bars into the office for measurement or vice-versa. To obviate this Mr. Broughall of Alfred Herbert, Ltd., has designed a micrometer on which the bars can be measured direct without application to the yokes and wedge. This necessitates the yokes being machined to a dead length and a daily trial of the yokes with a point gage, 0.003 in. oversize, the yokes being discarded when the point gage will enter, which in daily practice is not often.

The shrinkage test is quite a comparative one. Although it cannot be relied upon to give a definite determination of the silicon content of the metal, under normal conditions, a shrinkage of 0.183 in. is equal to 1 per cent silicon, and to take the other extreme 3.5 per cent silicon is associated with 0.123 in. shrinkage. It is surprising with low-silicon irons, where one is sailing near the wind as to machinability, what a great amount of change is expressed by a variation of 0.008 in. It is obvious, then, that the test requires not only to be carefully taken, but intelligently diagnosed if the best results are to be obtained.

By splitting the ends of the bars which have been cast adjacent to the yokes a good impression not only of the chilling quality of the iron, but of the way in which it backs off into the gray, is obtained. The full benefit of this test is obtained, however, by testing the bars for deflection and transverse breaking load. One of the most important points to be watched in connection with the transverse test is the deflection obtained. Unfortunately, the machines usually employed for this test are rarely fitted with any apparatus that will give a reliable result, owing to their leaving no permanent record after the bar is broken. The machine designed by Keep for use with the $\frac{1}{2}$ -in. square bars, previously described, is fitted with a mechanism which, giving a permanent diagram to a scale of five times the actual deflection, meets all the requirements one could wish.

The following table gives average particulars of shrinkage, deflection and breaking load obtained with various classes of iron:

Class of Material	Shrinkage, Deflection, Inches	Load, Inches	Breaking Load, Pounds
Tough strong iron.....	0.160	0.25	550
Hard strong iron.....	0.168	0.22	630
Soft iron.....	0.123	0.18	423
Mottled iron.....	0.207	0.11	375
White iron.....	0.226	0.08	250

From this it will be seen that to obtain a big deflec-

tion strong irons are necessary, whereas many believe that greatest deflection can be obtained with soft irons.

Hardness and the Brinell Test

Science has so far not succeeded in formulating a satisfactory definition of the term "hardness." A most desirable test for cast iron is for its *general* hardness—not surface hardness—or rather density, which for this metal is best described by Dr. Unwin as the resistance to penetration. The most handy and reliable form of test is therefore the drill test. As this test, like many other mechanical ones, is purely comparative, it matters very little—within reasonable bounds—as to the exact methods adopted to take it, so long as they are repeated in each test.

In connection with the Brinell hardness test, one of the objections lodged against it is the difficulty of measuring accurately the size of the indent; it undoubtedly requires very great care if accurate results are to be obtained. To avoid this the British Chuck & Piston Ring Company of Coventry, has invented a simple and ingenious device for its own use which is easy to manipulate, and has the further advantage that the test is a mean of two specimens.

Fig. 1 shows a section of the container with the two test pieces and the test ball in position; it will be seen to be so designed that the two outside faces of the test pieces are directly parallel and also that the ball is kept central. After the container has been screwed up tightly, the length overall is measured by a micrometer, the whole is then put under a drop hammer, which weighs 56 lb., and is allowed a drop of 18 in. After the

on the Continent, in connection with Diesel engine work. A satisfactory test is on bars 40 mm. square (1.57 in.) supported on knife edges 160 mm. (6.3 in.) apart, and by dropping a weight of 12 kilos (26.5 lb.) from a height of 30 cm. (11.8 in.), increasing the height of drop by increments of 5 cm. (1.9 in.) until the sample breaks, the height at which the bar eventually fractures being taken as the impact figure. Attached to the weight, in such a manner as to strike the bar parallel to the supporting knife edges, and the center of same, is another knife edge. The face of all the knife edges should be rounded 1 1/16 in. radius. A result of 55 cm. (21.5 in.) is considered none too high for the work named, although this is quite a severe test. The maximum attained, as far as the author knows, has been 80 cm. (31.3 in.).

Strength of Steel at Various Temperatures

The tensile strength, elongation and contraction of area of mild steel between 70 and 720 deg. C. and the resistance to impact tests between 40 and 920 deg. C. have been studied by O. Rheinhold in Germany. These experiments, as reported in the London *Ironmonger*, indicate that the tensile strength diminishes with rising temperature to a minimum between 60 deg. and 200 deg., the upper limit being raised as the proportion of carbon increases. The maximum strength is reached at 220 to 350 deg., the position also varying with the carbon content. Contraction varies inversely with the tensile strength and at 600 deg. amounts to about 90 per cent. All the curves of expansion exhibit two maxima and one minimum. At temperatures below 500 deg. the toughness is greater the lower the carbon content, but at higher temperatures this condition is reversed. In the impact bending tests the behavior of the material varies considerably at different temperatures. At about 600 deg. it bends without tearing, while at other temperatures a clean break is obtained.

Researches in Invar Steel

In researches in invar steel presented by C. E. Guilleaume before the Academie des Sciences, Paris, recently, he states that quenching lowers the expansion in comparison with that of the untreated alloy, and that the same effect is produced by cold working, the action of the two treatments being cumulative. Subsequent moderate reheating partially restores the original properties, and red heat completely so. In treating these alloys with a view to lessening the expansion as far as possible, a slightly negative expansion is imparted, inasmuch as the material contracts when heated. Then, by inverse methods, which also have a stabilizing influence, the expansion can be reduced to as near zero as is required. The wires used for geodetic measurements are treated in this way, with the result that no correction for temperature is needed when the readings are taken.

Magnesite Nozzles for Ladles

At a recent meeting of the Faraday Society (British), Sir Robert Hadfield, the president, emphasized the use of magnesite in place of fireclay for the nozzles of steel casting ladles. Specimens exhibited showed that after 77 heats, a magnesite nozzle was not appreciably fluxed but that a fireclay nozzle, after similar service, had been so eaten away that its diameter was increased from 1 to 2 in. This threw, he thought, a lurid light on the origin of ghosts in steel.

Controlling the carbon content of iron or steel is covered by a patent (U. S. 1,205,611) granted to Bruce Ford, Philadelphia, Pa. Molten iron is supercarburized in a Bessemer converter by alternately passing through the iron a hydrocarbon gas and air through separate valves. This carburized iron is then added to decarbonized iron in another converter and the final product is obtained. The ultimate carbon content is determined by the amount of supercarburized iron added. As this latter iron has practically the same carbon content, no chemical analysis is stated to be necessary.

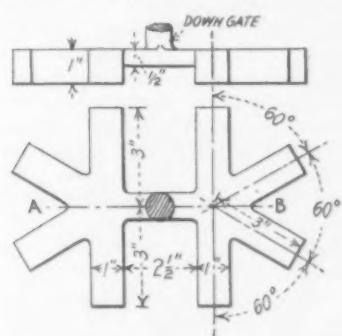


Fig. 2—Scheme of Test Bars for a Workshop Test for Determining Casting Temperatures

blow has been given the container is screwed up tightly to take up the indent made in the specimens and the overall length again measured, the difference between it and the previous measurement being considered the hardness numeral.

Low-silicon cast iron is very prone to the effects of casting temperature, and some irons employed for such purpose are also liable to liquid contraction. A handy workshop test for casting temperature with this class of iron, which the author has used successfully for many years, consists in making bars of the general dimensions shown in Fig. 2. When cold the bars are broken through the line A B, the condition of the fracture giving an indication of the temperature at which the metal was poured.

A research to prove the effects of volume of blast upon cupola working has shown that pressure not only has an effect upon the quality of the metal, but also upon the quantity melted in a given time, the following formula for most efficient working being deduced:

$$\frac{W V P}{D} = 330$$

Where D=diameter of the cupola melting zone in feet. W=quantity of air in lbs. per minute. P=gage pressure of air in oz.

In every case where high-class work requiring low-silicon iron has to be dealt with, the cupola should be fitted with a recording blast pressure gage, and the revolutions of the blower should be capable of variation while at work.

Impact Testing

While impact testing is not usually applied to cast iron, it is, however, beginning to be used, particularly

George Smart Joins "The Iron Age"

As announced briefly elsewhere in this issue, George Smart, for the past twelve years editor of the *Iron Trade Review*, has accepted the appointment as one of the editors of THE IRON AGE.

When A. I. Findley was editor of the *Iron Trade Review* he appointed Mr. Smart as associate editor in 1902, and three years later, when Mr. Findley came to THE IRON AGE, Mr. Smart succeeded him as editor in charge of the Cleveland paper. In the carrying out of plans recently made for the expansion of THE IRON AGE, Mr. Smart's promotion to his new position naturally grows out of the earlier association of the two men in iron trade journalism. Mr. Smart accepted THE IRON AGE appointment Feb. 1 and thereupon tendered his resignation at Cleveland. He comes to New York with the esteem and good wishes of many friends in the iron trade of the Middle West.

Mr. Smart has had an extensive newspaper experience. He was the legislative correspondent at Columbus



GEORGE SMART

for the Cincinnati *Enquirer* and was on the staff of the Cleveland *Plain Dealer* for eight years as reporter, editorial writer and Washington correspondent. He was one of the founders and first editor of the Columbus *Citizen*.

He has been active in college and civic affairs. For the past four years he has been a member of the committee on industrial development of the Cleveland Chamber of Commerce and was chairman of the committee on Government armor-plate plant. He took a decided stand against the building of such a plant by the Government and, as a result of the committee's recommendation, the Chamber notified Secretary Daniels that it did not desire to have Cleveland selected as the site for such a plant.

Mr. Smart was born at Chillicothe, Ohio, and was educated at Ohio State University. In 1910-12 he was national president of the Phi Kappa Psi fraternity and last June was elected president of the Ohio State University Association, a strong national organization of 3500 members. He is a member of the American Iron and Steel Institute and author of the chapter on "How to Determine the Value of Iron Ores" in "The A B C of Iron and Steel."

New Vigor in British Trade

An indication of what this country is to expect from Great Britain, in the way of competition after the war, is shown in the following extract from the last monthly circular of Hanson, Brown & Co., Middlesbrough:

"The war has opened our eyes. It has demonstrated to ourselves and to the whole world that there were latent in our iron and steel industries undreamed-of possibilities of expansion and development. To meet the illimitable demands of the war great new works have been and are still being erected and extensions effected in all directions. British manufacturers have risen magnificently to the great occasion, and the workmen, liberated for the period of the war from cramping trade-union restrictions, have fully proved the proud British contention that there are no better workmen.

"The great problem of to-day is how to adapt to the purposes of peace the mighty developments brought about during war. There has been much discussion of this vital problem. It is difficult, complex and many-sided, but it is not incapable of solution if tackled with good will and determination by all concerned. First in importance, perhaps, should be placed the necessity of affording reasonable security to our industries against bounty-fed competition. Only so will it be possible to attract more capital for the purpose of enlarging production and modernizing works. Next is the desirability of effecting a real reconciliation between capital and labor on the basis of mutual service and mutual respect. High wages must follow high production, but neither is possible unless the workers are prepared frankly to throw over the disastrous fallacy that restriction of output is to their advantage.

"As regards education, the nation must wake up to the importance of thorough scientific and technical instruction based upon the actual requirements of industry, and provision must be made, in association with our great centers of industry and manufacture, for experiments and research. Employers, forsaking old prejudices, will have to organize and combine for the better and more economical utilization of their joint resources at home and for the more efficient prosecution of British trade abroad.

"There is thus much to be done, but the omens are favorable. If the war has revealed many defects it has also opened up great opportunities. Among all classes a new and vitalizing spirit is at work, and there is evidence everywhere of a real determination to make a decisive break with the past and to inaugurate a new era in British industry."

Scovill Mfg. Company's Earnings

The annual report for the year 1916 of the Scovill Mfg. Company, Waterbury, Conn., shows that it has been one of the most successful of the munition makers, its specialty being time fuses. Its net earnings, with but \$5,000,000 capital stock, were \$13,403,462 and it paid dividends of \$111 a share for the year. Out of earnings the company spent \$3,654,386 in plant additions and charged off about \$2,000,000 for depreciation. The general reserve for contingencies and improvements was increased from \$1,500,000 to \$4,000,000; a special reserve of \$2,200,000 set up for taxes; and inventory increased about \$1,800,000.

Some interesting figures obtained from the 1916 and 1914 balance sheets are these: Plant account increased from \$4,357,656 to \$9,811,933, cash from \$343,560 to \$6,047,763, and surplus from \$3,063,845 to \$15,911,670; accounts and bills receivable increased from \$1,000,633 to \$5,671,587, while, despite this heavy increase in business, accounts and bills payable at end of 1916 show only \$809,567 against \$2,882,354 in 1915 and \$287,814 in 1914.

Joseph Wayne, Jr., chairman of the Reorganization Committee of the Standard Roller Bearing Company, Philadelphia, reports securing the necessary consent of creditors representing 90 per cent of claims to the proposed plan of sale of the properties. A majority of the stockholders had already given their approval to the plan. The time limit set by the court for completing arrangements preliminary to the sale is Feb. 27.

Youngstown Sheet & Tube Annual

The annual meeting of the Youngstown Sheet & Tube Company was held in Youngstown, Ohio, Feb. 13. The proposition to declare a stock dividend of 100 per cent on the common stock was unanimously defeated. The management opposed it, deeming such action unwise at this time. President J. A. Campbell gave out a statement in reference to results of operations in 1916. The net profits of the company and its subsidiaries were \$16,742,502. There was expended for new construction, purchase of the Andrews & Hitchcock Iron Company, retirement of about \$1,500,000 of bonds, payment of coal land notes and for interest and dividends, about \$15,000,000. The surplus as of Jan. 1, 1917, was between \$21,000,000 and \$22,000,000. The surplus as of Jan. 1, 1916, is understood to have been about \$7,000,000. The total disbursement on payroll was \$11,079,087, nearly 50 per cent greater than for the previous year. The gross business for 1916 was \$56,919,268, virtually double the gross business of the previous year. In 1916 the company shipped 908,000 tons of finished product as compared with approximately 800,000 tons the previous year. The 1916 pig-iron production was 1,032,774 tons; steel-ingot production, 1,216,003 tons. With reference to 1917 sale conditions, it is said the company is sold farther ahead than ever before at this time of the year.

Amasa S. Mather, Cleveland, was named a member of the board of directors to succeed Harry G. Dalton, resigned, owing to his membership on the board of directors of the Lackawanna Steel Company. C. H. Booth, chairman United Engineering & Foundry Company board of directors, was named a member of the board to succeed H. H. Stambaugh, resigned, owing to membership on the Brier Hill Steel Company board. Other directors re-elected are John L. Severance, Robert Bentley, George E. Day, James A. Campbell, Richard H. Garlick, C. D. Hine, J. G. Butler, Jr., and E. L. Ford. The board of directors reorganized by electing officers as follows: J. A. Campbell, president; H. G. Dalton, first vice-president; C. S. Robinson, W. E. Manning, Richard Garlick and L. G. Campbell, vice-presidents; W. E. Manning, secretary; Richard Garlick, treasurer; W. J. Morris, assistant secretary and treasurer; J. J. Brant, auditor; H. G. Dalton, E. L. Ford and C. D. Hine, advisory committee. Dudley R. Kennedy was appointed assistant to the president. For the past two years Mr. Kennedy has been head of the industrial relations department of the B. F. Goodrich Company, Akron, Ohio. Previously he was chief claim agent of the Youngstown Sheet & Tube Company. For the past five years L. J. Campbell, son of James A. Campbell, has been assistant to the president, but under the reorganization has been made vice-president. Under the old organization Mr. Dalton was first vice-president and C. S. Robinson second vice-president.

The company is planning to increase its coal and coke production. It owns 7100 acres of coal land in southwestern Pennsylvania, estimated to be underlaid with 70,000,000 tons of steam and coking coal and expects to sink two shafts on the property with capacity for producing 6000 tons daily. It is now consuming about 5000 tons of coal daily but extensions of by-product coking facilities sufficient to produce coke for the two Hubbard stacks will make it require fully 6000 tons. On this account plans are being made for the indicated daily production.

The Loomis Sielaff Company, 314 Rockefeller Building, Cleveland, incorporated with a capital stock of \$150,000, has completed its organization by the election of M. C. Rosenfeld, of the Grabler Mfg. Company, president; F. W. Steinen, vice-president; H. D. Frohnapple, secretary, and C. E. Terrill, treasurer. The company is building a temporary plant, 65 x 75 ft., at 6616 Morgan Avenue, where it has acquired a six-acre site and in the spring expects to start the erection of a large permanent plant. Its principal product will be the manufacture of cast-steel automobile truck wheels. The company will not operate a foundry, but will do the machine work on the wheels.

Sharon Hoop Buys Youngstown Company

As briefly indicated on page 463 of THE IRON AGE of Feb. 15, the Sharon Steel Hoop Company, Sharon, Pa., has acquired a controlling interest in the Youngstown Iron & Steel Company, Youngstown, Ohio. About \$200 per share is said to have been paid, involving about \$4,000,000 in the deal.

The Youngstown Iron & Steel Company was established in 1894, as the Youngstown Iron & Steel Roofing Company, with a capital of \$12,000. It engaged in the manufacture from sheet steel of roofing, eaves trough and conductor pipe. The company prospered from its inception, and in 1901 erected a plant having nine hot sheet mills and other equipment for making black and galvanized sheets, adding in 1910 a 72-in. three-high plate mill. Later it acquired land at Lowellville, near Youngstown, on which it completed in 1915 an open-hearth steel plant having three 80-ton open-hearth furnaces (a fourth now being erected), a 36-in. three-high slabbing mill, a 30-in. three-high sheet-bar mill and two four-hole soaking pits. The company arranged at that time to secure molten metal from the adjacent Mary furnace of the Ohio Iron & Steel Company for its steel plant, and this arrangement is still in effect.

Only very recently were overtures made for securing a controlling interest in the company by the Sharon Steel Hoop Company, but these developed rapidly and in the middle of last week the deal was consummated. While the buyer has not yet taken possession of the plant, it will do so shortly. The Sharon Steel Hoop Company was incorporated in 1900. Its capital stock, authorized and outstanding, is \$2,500,000. The par value of the shares is \$50. Its annual output is 120,000 tons of steel billets and sheet bars and 95,000 tons of finished rolled products, including steel hoops, bands and cotton ties. S. P. Ker is president; G. W. Short, vice-president, and J. R. Evans, secretary and treasurer. Frederick H. Schmidt is the temporary president of the Youngstown Iron & Steel Company and C. B. Cushwa general manager, succeeding John O. Pew, resigned as president and general manager. H. W. Heedy has been elected treasurer to succeed Mason Evans, resigned. It is probable that after the Sharon Company takes possession of its newly acquired property some changes among officials may be made. It is stated that the steel plants of the Sharon Company and the steel plant and finishing mills of the Youngstown Company are to be extended, and probably some new lines of product made. It is intimated that the Sharon Company will increase its capital to \$10,000,000 as soon as formal transfer of its new properties has been effected. With the acquisition of the Youngstown plants, the Sharon Company will have an annual capacity of close to 350,000 tons of semi-finished and finished steel.

Fabricated Steel Business in January

The volume of fabricated steel business which was put under contract in January amounted to 61 1/2 per cent of the capacity of the bridge and structural shops of the country. It is understood that the basing figure now used is somewhat larger than formerly, to take into account the increase in structural capacity made in the last year. The January rate is the lowest since last September. It compares, however, with 60 per cent of contracting which was the average for January for three years prior to the European War, or in 1912, 1913 and 1914. The average rate of contracting over the last half of 1916 was about 116,500 tons monthly, or only about 5 per cent in excess of the January business.

The Central Iron & Steel Company, Harrisburg, Pa., is planning the construction of a 130-ton open-hearth furnace. One of its two blast furnaces which have been idle for three years will be blown in April 15.

The largest known deposits of molybdenum ore in the world are reported to have been discovered in southern Peru.

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We take pleasure in announcing that George Smart, for the past twelve years editor of the *Iron Trade Review*, has accepted the appointment as one of the editors of THE IRON AGE.

The Mechanical Engineer in War Time

Less than one year ago the American Society of Mechanical Engineers performed a great public service. At its New Orleans meeting last April, it placed on record the ideas and suggestions of a large number of its members as to how the engineers and industries of the nation could best fit themselves to back up its armies in the field and its navy on active service should we unhappily be drawn into war. As a piece of constructive criticism, involving the welfare of the whole people, the discussion at New Orleans deserves a big place in all the literature of engineering.

To-day, standing in the shadow of war, we will do well to take stock of those suggestions and profit by them, if we have not already done so. "Preparedness" to-day has a real meaning. It means not only a numerous well-drilled adequately-equipped army and a large and efficient navy, but also an organized army of industrial workers to maintain a continuous movement of supplies to the army and navy. No less an authority than Gen. Leonard Wood has said that every man in the field requires three men at home to keep him supplied with the means of effective warfare. Within the limitations imposed by Congress, the military authorities have done splendid work for the purely military and naval features of our needs. By means of Plattsburg camps, civilian cruises and the like, they have made earnest and successful efforts to train men for responsible positions in the army, navy, the engineer corps, the patrol fleet and auxiliary services. They have cataloged and classified thousands of men who will be available for the special services for which they will be best fitted in connection with the work of actual warfare.

What has been done toward the organization of the more numerous and equally important army behind the firing line? Aside from the recently completed census of industrial plants that would be available for purposes of war, we fear little or nothing.

There can be no doubt that in war time the

engineers would form one of the most valuable assets of the country. It is imperative that this asset be not wasted by assigning these highly trained men to duties which can be as well performed by others. It is a false patriotism which will cause a man to enlist in the ranks when his technical ability is such that he could do far greater damage to the enemy by carrying out more prosaic duties far behind the battle line. The civil engineer will readily find his place with the field forces in the engineer corps where his education and training can be used to advantage. The mechanical engineer can find more than enough to do in factory and shipyard.

One of the questions that confront the country at the present moment is how best to utilize the ability of its mechanical engineers. Hundreds of them are to-day engaged in the manufacture of munitions for the Allies. Unquestionably, these men should be retained at their present work, with the added duty of training other engineers to aid them to carry on the vastly expanded industry. In the navy yards are many naval officers acting as constructors and doing work that otherwise could be performed by civilian engineers. The engineers from commercial engine and boiler shops, from machine and structural plants generally, could be drafted into the service of the navy yards, thereby releasing the naval officers for active duty at sea. Engineers whose work brings them into contact with steam and electric power very properly would find a place in the engine and boiler rooms of the warships where their special ability would soon fit them for responsible subordinate positions. Industrial and management engineers by their training are undoubtedly fitted to take charge of the organization of the various industries which would necessarily be expanded to many times their present size.

The first step to be taken to utilize the latent possibilities of the mechanical engineering profession for war is to catalog every mechanical engineer in the country. The Government should have on file the name of every man, and the address at which he can be quickly reached, together with a statement of his experience and the character of work in which he could render the greatest service to the nation. Then as need developed, as with plant expansions, executives would have access to live reliable lists from which capable men

could be located and offers made to enlist their services in these plants. Thus would there be less chance of amateurs being employed under the emergency conditions. The membership lists of the national engineering societies will furnish the nucleus of such a list for the Government. It could be rapidly supplemented from many different sources. Such a mobilization of the engineers is every bit as important as the mobilization of the industrial plants.

Antagonisms Lost in the War Crisis

The evidences are widespread of the sobering effect of the great crisis through which the nation is passing. What is especially significant is the submergence to a large extent of economic questions which long have developed antagonisms. Organized labor quickly turned on the President when, after going to extraordinary lengths at its behest in the railroad crisis, he came out for legislation to prevent employees tying up transportation lines as a means of enforcing demands. Now, in the face of a situation which might lead to temporary Government operation of the railroads, the agitation of the right of a trainman to quit work when he chooses disappears. The country is learning, by being face to face with conditions calling for the exercise of centralized power, that the public welfare must always take precedence—even over the right of a labor union to bring on a strike.

The Secretary of the Navy, after months of hectoring corporations which supply armor plate and munitions to the navy, is brought into closest co-operation with these self-same companies in response to their offers to expedite in every possible way any work which may aid in speedily establishing a war footing.

In the months just ahead the people of the United States are likely to see that the public interest demands a broader view of some questions, long agitated nationally, than many public men have been willing to take. Fear that capital at home would profit by proposals for the encouragement of American ownership of merchant vessels has been at the bottom of a do-nothing policy in shipping, of which the fearful folly is now beyond dispute. The war crisis will not have come in vain if it puts away once for all the dog-in-the-manger spirit that, more than anything else, has kept the United States out of a place on the high seas worthy of its rank in the trade of the world.

The present situation may modify further the attitude of the Government toward great corporations. In the steel trade particularly, the past two and a half years have shown how the integration of companies taking in all the range of products in iron and steel has prepared the United States for the opportunity the war has brought it. The efficiency of the United States Steel Corporation as an instrument of American trade extension has never been so signally evident as in the unparalleled shipping and other export conditions existing in the past two years. The argument that not monopoly, but integration for the building up of a great export trade in American steel, was aimed at in the formation of the Steel Corporation was the real ground on which the Federal Circuit Court found for the corporation in the suit to dissolve it. That

argument has been greatly strengthened by what has happened since Europe went to war. To-day it is not only the strong position of the Steel Corporation but that of the half dozen great independent steel companies and consolidations that has made it possible for the United States to meet so largely the world's demand for steel since the cutting off of exports from Germany, Great Britain, France, and Belgium. And if this country is forced into war the resources of these much decried consolidations will be one of its most effective weapons. After the war, the aggregated strength of these companies will be no small item in the inventory of this country's resources for the meeting of international competition in steel products. It will all be needed as an offset to Europe's syndicates and the trade agreements of allied nations.

Further illustrations might be added of the new thinking that may be expected as a result of such a time of national testing. Differences of interest have been long emphasized and exaggerated and class feeling has been persistently stirred up, often for partisan purposes. Now that the American people are being drawn together by the pressure of aggression from without, they will find that not the least of their compensations will be their ability to take a more just view of some domestic issues, and to make a truer appraisal of some economic and industrial forces that, in the face of bitter denunciation, have been working for national upbuilding.

British Steel Trade Prospects

The pressing necessities of the British iron and steel industry will in all probability, as soon as the war is over, be placed well in the foreground by the advocates of thoroughgoing reform in Great Britain's fiscal policy. The country owes much, perhaps its very existence, to steel and its makers. The industry has not only proved itself to be basic in the fullest meaning of the word, but it has provided that "impregnable bulwark" of guns, shells and ships which have saved the cause of the Entente Allies from disaster. The British situation, in the light of current developments, is well worthy of our attention.

Since the war began about £15,000,000 (\$75,000,000) has been spent on improving old plants and equipping new ones. Development on these lines is going on with undiminished speed, and it is estimated that by the end of 1917 the amount of new capital that will have been invested in the industry will be fully £30,000,000 (\$150,000,000). This is private capital, not Government money furnished for the construction of plants intended for temporary purposes. The bulk of it will doubtless have yielded substantial returns by the time the last war order has been executed, but not such profits as have been earned by many American manufacturers, who are free of anything even distantly approaching the heavy war taxation their British contemporaries have to pay.

This \$150,000,000 is a permanent investment, and when the thunder of the guns shall have been silenced by the advent of peace and British industry returns to its normal channels, the men who have provided the capital will naturally look for interest. In other words, new steel capacity, though created

by the pressing necessities of war, and hitherto devoted to the making of military and naval material, must then be kept busy on a different class of work. Every economic consideration demands this, for unproductive capital is bad for the wage-earner as well as for the stockholder and, moreover, the largest output possible in all industries will be one of Great Britain's imperative necessities for many years.

Whether a greatly enlarged, modernized and speeded-up British iron and steel business could be conducted satisfactorily if the country adhered to its Free Trade principles is a question that is being answered more and more frequently and emphatically in the negative. Unless present indications are falsified by time, the aftermath of war will bring about that protection of British industries which the eloquence and immense popularity of the late Joseph Chamberlain failed to achieve. There are those who say that Free Trade is already dead in Great Britain, and certain it is that many of its former most strenuous champions have recently cast it aside. Among them is John Hodge, Minister of Labor, who by some characteristically blunt utterances has made his position in the matter quite unmistakable. Mr. Hodge, who has for many years been secretary of the British Steel Smelters', Mill, Iron and Tin Plate Workers' Association, declares that he is not prepared to see any furnace idle because the door of the country has been left open to foreign competitors. He will not, he says, see his own trade ruined through "obsolete political doctrines of the Cobden school of Manchester," and is inclined to regard as "intellectual snobs" those idealists who refuse to learn from experience and persist in advocating old fiscal principles.

If, as in every way seems probable, a bigger and stronger British steel trade is protected by a tariff after the war, the United States will have a new factor to take into account—not a particularly dangerous one, perhaps, but undoubtedly one to be respected. The British market will fall almost entirely into the hands of the home manufacturer, and it is to be expected that British steel will enter more strenuously than for many years past into competition for business in all parts of the world.

British Showing on Short Work Day

Six hours may be the proper length of the work day. Perhaps it should be 6 hours 43 minutes, or 7 hours 10 minutes, or 9½ hours, depending on the kind of work, other things being equal. That there may be some very definite proper length, on the average, for a specific industry seems believable. The British investigations of fatigue, reviewed on page 473 of this issue, are at least bound to direct thought in this channel.

According to those investigations, a group of workers in 10 hours averaged a greater production than the same group did in 12 hours, and then in 8 hours they beat the 10-hour average, and therefore, of course, the 12-hour average. By a reductio ad absurdum it would seem that in 5 hours more might be produced than was done in 6 hours, and more in 4 hours than in 5 hours, and by not working at all we would achieve everything we wanted. Seriously considered, however, the scientific man can-

not help admitting that, other things being equal, such is the influence of fatigue, necessary as well as unnecessary, that perhaps there is some limited range of time within which the work day ought to be confined. If it is in the neighborhood of 8 hours, or if it is a less period than 8 hours, we have for some years been extravagantly using our physical forces and have been extravagant in a money sense, in that we have paid more than we should for what could have been obtained even under the best conditions of shop spirit and surroundings.

Comment cannot be withheld in an attempt to generalize on the results of the British investigation that the studies have been made almost exclusively of workers in cotton factories, although one metal-working industrial establishment was considered. To be thoroughly convincing, the studies need to be of wider scope and perhaps of a greater number of individuals than were made the subjects of examinations. The inference might also be taken that there exists at present a special incentive, from a patriotic motive, and that thus output has some special relation to the war exigencies. Opinions of close observers, as well as the experience of those in this country at the time of an absorbing war like the Civil War are that except for the first few weeks the attitude of mind of the worker is, to all appearances, not different from that in ordinary times. The tasks are soon regarded as in the day's work, and incentive is very largely proportional to the wage awards. It seems reasonable to assume that there is no factor of special incentive.

Certainly there is every indication that the studies have been thorough. They have taken into some account the influence of living conditions, of the habits of the individual workers, and of the kind, quantity and suitability of food. Many of the workers under observation have undoubtedly profited from the investigations, and changes in diet and in out-of-factory life may have reacted in the better shop performance. The general European practice of light eating on rising, with a so-called breakfast early in the morning work period, needs also to be discounted in considering the results as applicable to industrial life in this country. Nevertheless, it must be admitted that such a thoughtful scientific investigation as this British fatigue study is a big contribution to industrial progress, and until further studies are made to substantiate or modify the findings, it will serve to commend consideration of the so-called shorter work day.

The American Society for Testing Materials will hold its twentieth annual meeting at Atlantic City, at the Hotel Traymore, June 26 to 30, inclusive. The effect of the increase in dues in 1916 is that instead of an estimated deficit of \$7,500 otherwise expected at the close of the year, the increase has brought about a surplus of \$1,785. The membership has also shown a gain, the increase for the year being 171, compared with, however, a net increase for 1915 of 208. The present total membership is 2132.

The sixth annual Safety Congress of the National Safety Council will be held in New York in the week beginning Sept. 10, the date having been changed because of the impossibility of getting satisfactory hotel and exhibit accommodations in October.

CORRESPONDENCE

Technical Literature Research—A Plea for Better Abstracting

To the Editor: Research has become very popular of late years, but one kind is still entirely neglected and overlooked—technical literature research. I mean by that the making of abstracts of articles and classifying, comparing, concluding—in a word, studying them with a view to developing something new from them, meanwhile turning the abstracts over to the practical men at the works, abstracts that are briefly and plainly worded and in as light a vein as possible. The nearest approach to anything like this is the practice at some works of providing small technical libraries and of circulating the technical journals among the heads of departments. But this is perfectly futile. A single worker devoting all his time cannot begin to keep up with it, not merely because of its volume but also because most writers describe their experiments or their theories with such ponderous dignity and such minute detail that it is often hard to tell just what they are trying to get at. Often they do not get at anything. No matter; the ponderous dignity and the minute detail must be employed anyway. One can spend weeks over a single paper only to emerge from the struggle with a not much greater gain in knowledge than that the author is an egotist who overrates the importance of his work.

Yet on the whole technical literature is of the very first importance, and practical research at the works without organized and systematic technical literature research is a very foolish performance. What prevents this from being generally realized is the delusion that the technical men at the works make it part of their business to keep up with the technical literature. They try to, it is true, but they might as well try to bale out the ocean. This in turn is another thing that is not realized, and the reason is that the abstracts of papers and articles that are put up by the technical society journals can be read without taking much time and are relied on to keep the technical men from missing anything. Right here is a tremendously important fact of which the trade and the profession are alike entirely ignorant. I know they are entirely ignorant of it because I was entirely ignorant of it myself until I came to settle down to technical literature research exclusively. That fact is that a single worker devoting his whole time to making genuine abstracts will hardly be able to get more than a drop out of the bucket, because of the great amount of study necessary to a thorough understanding of most papers. And therefore any number of workers, like the journal abstractors, essaying abstracting as a side performance to their daily toil, not only accomplish no good, but actually do mischief. This is not mainly because the abstracts are unintelligible, but because too often they are merely amplifications of the titles of the original articles, telling at greater length what the authors are working at.

Some abstracts are as good as it is possible to be; but on the whole the journal abstracting is a failure. From a volume of the *Journal of the Iron and Steel Institute*, for instance, I find myself able to extract perhaps a dozen points from the abstracts. Perhaps this is my fault, and I hope to get some other technical man to see if he can get more from them. But if I am right, then of course this kind of abstracting is not merely a waste effort but a harmful effort as well. To get the abstracting done right and to get the research feature, it must be done at the works, and by men doing nothing else; and it must be done before any practical research can be effectively undertaken. It is an absolute necessity, and the large works of the future will have technical literature researchers by the dozen and will consider this form of research as more important than practical research. Also it will be a feature of THE IRON AGE some day.

GEORGE AUCHY.

Tacony, Philadelphia, Feb. 15, 1917.

FREIGHT CONGESTION RELIEF

Agreement of 32 Railroads—Empty Cars to Be Rushed to Needed Points

WASHINGTON, D. C., Feb. 20, 1917.—The heads of 32 railroad systems, after a conference with officials of the Interstate Commerce Commission, will lay embargoes that will probably affect the exportation of iron and steel, especially war material, and also influence the domestic movement of iron and steel products. The plan thus adopted for relieving the unprecedented freight congestion will result in the placing of an embargo on all export shipments of every kind through Atlantic ports, and it recommends what is styled "an intelligent embargo" on all domestic east-bound shipments except food and coal. It also contemplates "the separation of all empty cars in congested yards from loaded ones and the dispatch of these empties westward in solid trains ahead of all other traffic except passenger trains."

The conditions which this action is designed to remedy have prevailed to some extent for many months but have become more acute since the resumption of unrestricted submarine warfare by Germany. American-owned cargo and passenger vessels have delayed sailings until advised of the policy of the State Department with respect to the arming of merchant ships and as to the possibility of securing naval convoys. British shipping has been held up to a material extent, both in American ports and at home, and many vessels flying neutral flags have hesitated to undertake voyages carrying them into the barred zone, especially in view of the great increase in insurance rates, and, though loaded and prepared for clearance, have indefinitely postponed their departure. The steamship docks have consequently been piled high with merchandise of every description, railroad yards have been filled with loaded trains and sidings for many miles from the principal ports of exit are congested with goods intended both for export and domestic consumption.

The Interstate Commerce Commission is informed that the car shortage has become so acute in certain regions that important industries are not only unable to ship their products but cannot obtain raw materials and are likely to be forced to shut down unless relief can be provided. On the basis of data in the possession of the commission the opinion is expressed that the railroads have not yet done all they possibly can to secure the prompt handling of empty cars and the expression of this belief has had much to do with the agreement of the railroad managers to adopt a more radical policy by making up solid trains of empties and returning them ahead of all freight traffic instead of moving them as occasion may offer in connection with loaded trains. Special agreements have been made between the managers of certain of the larger railroad systems to loan each other empty cars for the purpose of handling food and fuel for domestic consumption and the raw materials necessary to keep the industries of the country in operation.

Officials of the commission do not look for much improvement in the situation until the question as to whether the United States will be forced into active hostilities with Germany has been settled. Should war be declared it is assumed that merchant vessels would be armed immediately and that convoys for American ships would be provided by the United States Navy while Great Britain would no doubt furnish a naval escort for cargo ships carrying war material purchased f.o.b. American ports or at the factories.

Whatever steps may be taken hereafter, it is certain that the month of February will show a heavy slump in the exports of iron and steel, which have been maintained almost at a maximum level for several months. Advices received here indicate there has been no decrease in production; hence it would appear that the measure of our exports for the next two or three months will be the ability of shippers to secure ocean transportation.

W. L. C.

THE MINING ENGINEERS

Grain Growth in Steel and Magnetic Concentration of Ores Discussed

The practical bearing of the grain growth in steel and the magnetic concentration of low-grade ores, including the question of the supply of low-phosphorus iron ores, were discussed at the opening sessions of the annual meeting of the American Institute of Mining Engineers, in session at the Engineering Societies Building, New York, as this issue goes to press. A session on Monday morning, Feb. 19, was devoted to metallurgy. The latter was taken up almost entirely with the presentation and discussion of three papers on the important technical subject of grain growth in steel. The three papers were "Grain Growth Phenomena in Metals," by Prof. Zay Jeffries, Case School of Applied Science, Cleveland; "On Grain Growth" and "Recrystallization After Plastic Deformation," both by Prof. Henry M. Howe, Columbia University, New York. In the absence of Prof. Albert Sauveur, who was to have presided, H. M. Boylston, Cambridge, Mass., occupied the chair. In introducing the subject he said that this important question had made rapid advances lately and the progress was such that investigators had just begun to get beneath the surface.

In the absence of Professor Howe his papers were presented by Prof. William Campbell of Columbia University, while Professor Jeffries delivered an abstract of his own paper. It was developed by the speakers that this subject, brought before the Institute about four years ago by W. E. Ruder, General Electric Company, Schenectady, N. Y., while yet in its infancy, is becoming more practical in its bearings as the studies proceed. There is a temperature, now usually termed "germinative temperature," at which in certain steels the grain growth proceeds at a rapid rate, affecting the quality of the steel. If the time of passing through this temperature be rapid, a fine grain structure is obtained. It is believed that the commercial bearing of these phenomena will be important in the annealing, heat treatment and rolling of metals when better understood.

Magnetic Concentration of Low Grade Ores

At a session on Monday afternoon, devoted to milling and smelting a paper on "Magnetic Concentration of Low-Grade Magnetic Iron Ore," by S. Norton and S. Le Fevre, was read in abstract by Mr. Le Fevre. The paper was largely a presentation of the Ball and Norton machine for magnetic concentration and its possible application to New York and New Jersey low grade ores. The authors' summary was as follows:

The known and partially developed ore bodies of New York and New Jersey could, if equipped with the best modern mining and milling machinery and using the best methods, produce at the present time 25,000 tons of 60 per cent iron ore per day. This can be delivered for an average freight charge of 75c per ton from mill to tidewater. The operating cost of production should reach the "dollar rock" ideal of the Lake Superior copper region, and the cost of mining and milling 1 ton of crude ore should be about \$1 for underground mining when handled in large quantities. The ratio of concentration would be 2 tons of crude per ton of concentrates for an average. There are reserves of magnetic ore sufficient to double the above production, and then last probably 100 years.

In discussing this paper in writing George C. Foote, Witherbee, Sherman & Co., Port Henry, N. Y., stated that "a crude ore containing 20 to 30 per cent iron and 0.20 per cent phosphorus will make, by magnetic separation, a product of ideal size for the blast furnace and of 60 per cent iron and 0.10 per cent phosphorus. There are millions of tons of such ore in the Adirondacks. Mining and milling cost with modern equipment and large tonnage should not average more than \$1 per ton of crude ore, with the cost of concentration, f.o.b. mines, not over 4 cents per unit and with freight to Eastern furnaces not over 3 cents or a total of 4 cents per unit of special low-phosphorus standard ore free from copper, at furnace. The normal price is 10 cents per unit with the present price from 15 to 20 cents per unit. The general opinion seems to

be that after the war 11 cents per unit will prevail for a number of years."

Mr. Foote emphasized the growing scarcity of low-phosphorus ores which may become a famine before many years. Of the estimated 1,100,000 tons of magnetic iron ore in New York, containing above 30 per cent iron, not more than one half is low in phosphorus. By concentration the phosphorus can be reduced one-half and the iron content increased to 60 per cent.

At the session on iron blast-furnace practice, Tuesday afternoon, Feb. 20, papers on blast-furnace gas and the construction of hot-blast stoves were presented, but the one by R. J. Wyson, superintendent blast furnaces, Bethlehem Steel Company, South Bethlehem, Pa., on "Potash as a By-Product from the Blast Furnace," created the widest interest. This paper was abstracted in THE IRON AGE of Jan. 18. The papers and discussion will be noticed in the complete report next week of the Institute's meeting.

Officers Elected

The result of the election of directors was announced at the regular business session on Tuesday morning, Feb. 20. The new president is Philip N. Moore, a consulting mining engineer of St. Louis, who received a total of 1205 ballots or about 200 more than his opponent. The two vice-presidents chosen were Charles W. Goodale, Anaconda Copper Mining Company, Butte, Mont., and Mark L. Requa, mining engineer, San Francisco. The five other directors elected were: Robert M. Raymond, 61 Broadway, New York City; Willet G. Miller, Bureau of Mines, Toronto, Can.; Allen H. Rogers, Boston, Mass.; Howard N. Eavenson, chief engineer, U. S. Coal & Coke Company, Gary, W. Va., and J. E. Johnson, Jr., consulting engineer, New York City.

The attendance at the early sessions was larger than at any previous meeting, the registration of 350 the first day nearly exceeding the total at the meeting a year ago in New York. A growing manifestation was noted of good fellowship and good cheer, particularly noteworthy for such a large convention. This has been characteristic of the Mining Engineers' meetings for some years and, it has been remarked, is spreading to other societies. One of the important of many social features was the reunion smoker on Monday evening. This was signalized by the presence of Herbert C. Hoover, chairman of the Belgian Relief Commission and also a member of the Institute. His introduction by Dr. R. W. Raymond, the Institute's secretary emeritus, was decidedly equal to the occasion. Mr. Hoover was given a thoroughly appreciative and demonstrative reception. He rapidly sketched a few incidents of his experience in London when the war broke out and of his later work.

At the annual dinner at the Hotel Astor Tuesday evening, a gift of \$100,000 to the library of the Institute in New York from James Douglass of Arizona was announced. Herbert C. Hoover, one of the speakers at the dinner, was elected to honorary membership.

The Engineers' Country Club, owning 240 acres of land near Roslyn, on the north shore of Long Island, N. Y., has been organized. The property includes one of the historic estates of Long Island and besides affording the opportunity to create a 36-hole course, has an extensive water front with a yacht landing and salt water bathing facilities. The club house is 20 miles from Columbus Circle, New York, and may be reached readily by automobile, train and boat. Activities to be provided include tennis, canoeing and bowling and in winter skating, tobogganing and skiing and even a landing for aeroplanes and hydroplanes is provided by the natural topography. Charles F. Quincy, president Q. & C. Company, 90 West Street, New York, is president. A booklet on the club may be obtained from N. M. Garland, 30 Church Street, New York.

A decimal system for British coinage seems to be actively under discussion in Great Britain. It is pointed out that the florin is one-tenth of one pound sterling, and that a farthing is at present 1/96 florin, and might easily be made 1/100 florin.

Our Benzol and Toluol Output

The benzol and other light oil output of the United States in 1916 increased more than 110 per cent over that of 1915, according to C. E. Lesher of the U. S. Geological Survey. The 1916 output was about 35,600,000 gal. against 16,600,657 gal. in 1915.

Toluol is now the most valuable of the oils obtained from coal gas, for the reason that it is the base of that most powerful explosive, T. N. T. (trinitrotoluene). Statistics have not been collected to show the quantity of refined toluol manufactured in 1915, but a moderate estimate would place it at 2,500,000 gal., and a like estimate of the output of toluol in 1916 would be between 5,200,000 and 5,500,000 gal., having a value at the works of about \$14,000,000. The output of benzol, solvent naphtha and naphthalene was correspondingly greater in 1916 than in 1915. Current market reports indicate that the price of benzol was sustained throughout the year at practically the same level as in 1915.

Until late in 1914 the only by-product ovens equipped to recover benzol were those owned or controlled by the Semet-Solvay Company. The production of light oils by that company in 1914 has not been published, but is generally understood to have been less than half the total output in the United States in 1915. The demand for benzol and toluol and the products derived from them, comprising explosives and chemicals used for dyes and other purposes, a demand that began early in 1915, stimulated the operators of by-product coke ovens to install benzol recovery plants, and in that year 17 plants with 3664 ovens were equipped for the recovery of light oil. These, with the 1504 Semet-Solvay ovens already equipped, made a total of 5168 ovens producing benzol at the beginning of 1916. In 1916 five new plants were started and additions were made to two old ones. Preliminary figures for 1916 show that, of the total of 6936 by-product coke ovens constructed by the end of the year, 5833 were equipped to recover benzol and other light oils.

It is estimated that the by-product ovens now under construction and projected will bring the annual productive capacity in the United States to more than 40,000,000 gal. of light oil by the end of 1917. An important factor in this increase will be the greater recovery obtained as the operators of the newer plants gain experience and as the equipment is made more effective. In 1915 several plants recovered on the average less than one gallon of oil for each ton of coal treated, a number saved between one and two gallons, and nearly one-third recovered more than two gallons. The general average was 1.54 gal. of light oil to the ton of coal.

Most of the by-product plants are operated for the primary purpose of making coke and others for the purpose of making gas. No plant is operated primarily for recovering benzol, which is therefore a by-product. The selection of mixtures of coals and the length and method of treatment in the ovens are governed by the requirements of the coke or the gas that represents the principal business of each plant, and only incidentally is treatment planned to increase or affect the recovery of light oil, and this accounts in part for the diverse results recorded by different plants.

Benzol Recovery in Russia

Benzol recovery in Russia has made rapid strides lately, according to the *Journal of Gas Lighting* (British), which states that the output in 1915 was 9670 tons. In the Donetz basin, which was previously the only producing district, there were at the beginning of the war 1082 coke ovens, of which only 358 had by-product and benzol recovery apparatus. In the first year of the war 1200 coke ovens came into action with recovery plant and 800 more were under construction. Also coke ovens with recovery installations were erected in the Kusnetzer coal field in western Siberia.

The big Etna furnace of the Marting Iron & Steel Company, Ironton, Ohio, had an explosion when trying to start up last week and it is estimated will take from four to six weeks for repairs.

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Huge Army Appropriation

WASHINGTON, D. C., Feb. 20, 1917.—The army appropriation bill, which has just passed the House, carries \$247,061,108. The bill as framed by the House Committee is \$20,000,000 less than the sum appropriated for the army last year, and nearly \$75,000,000 below the estimates submitted by the War Department. There is good reason to believe, however, that the Senate will make substantial increases in the chief items and that the measure, when finally enacted, will break all records for the total amount appropriated thereby.

The efforts of War Department officials to induce Congress to grant to the Department full discretion in the disbursement of appropriations for war material so that the well-matured policy of the Bureau of Ordnance of encouraging private manufacturers by liberal patronage may be carried out, have been fairly successful, and the Bureau will have at its command not only a large sum for the purchase of guns, ammunition and other material, but also a substantial amount available for the equipment of private establishments for the manufacture of material made to U. S. army standards.

In spite of the extraordinary showing made by the reports to the Ordnance Bureau of the demoralizing effect of abolishing scientific shop management in the arsenals, the House Committee has again included in the army bill the prohibition of time studies and premium or bonus payments. In view of the action taken by the Senate, which accepted this prohibition as a feature of the fortifications bill, it may be assumed that all the national defense bills, as finally enacted, will forbid the use of scientific shop management systems.

Reports of a grossly inaccurate character have appeared in the daily press the past week, representing that the Government is about to make an important experiment in the employment of women in the manufacture of war munitions, following the example of the belligerent countries of Europe. As a matter of fact, the War Department has nothing of the sort in contemplation. For many years women have been employed at Frankford and elsewhere tending small automatic machines used in the production of small caliber fixed ammunition, and it is for this work only that the Department is now seeking additional labor.

The War Department is finding considerable difficulty in securing sufficient labor to keep the arsenals running at the desired rate of output, as private munition makers have offered tempting increases in wages to secure the best operatives in the Government employ, but up to the present time there has been no suspension of work as the result of labor shortage. W. L. C.

Prevention of Piping in Steel Ingots

The *Elektrotechnische Rundschau* describes a method of preventing piping in steel ingots which resembles the Hadfield process, inasmuch as a frame is used, but differs from it in that, instead of lining the frame with pre-heated charcoal, a lining of molding sand is rammed in, resting on a layer of charcoal sticks. When this frame is placed on the ingot mold and the hot metal is poured in, the heat of the latter sets fire to the charcoal, which burns away and allows the frame to be taken off when the casting process is terminated, leaving behind the fireproof lining, which protects the gate from cooling until the ingot itself has become solid. Given a gate of proper dimensions, this method is said to furnish sound ingots, free from piping.

The results of a vocational education survey of Minneapolis, conducted in 1915 by the National Society for the Promotion of Industrial Education, are brought together in Bulletin 199, issued by the United States Bureau of Labor Statistics. One of the outcomes of the survey was the establishment of trade understandings providing for co-operation between schools and the trades and industries, by which the former are undertaking to adapt their courses of study to meet the needs of industry, and the latter have agreed to give preference in the selection of workers to those who have availed themselves of such instruction.

The Pittsburgh By-Product Coke Company

Announcement was made on page 233 of THE IRON AGE of Feb. 15 that the Bethlehem Steel Company had acquired the by-product coke plant of the Lehigh Coke Company at Didier, Pa. This coke plant was first acquired by the Pittsburgh By-Product Coke Company, affiliated with the H. Koppers Company, which in turn sold it to the Bethlehem Company. The Pittsburgh By-Product Coke Company is stated to have paid about \$7,000,000, but the price at which it made the sale to the Bethlehem Company has not been disclosed.

The Pittsburgh By-Product Coke Company is an organization formed about a year ago, with a capital of \$10,000,000, for the purpose of building and operating by-product plants. H. B. Rust is president; C. J. Ramsburg, vice-president; W. F. Rust, vice-president, and S. T. Brown, secretary and treasurer. The directors are R. B. and A. W. Mellon, leading bankers of Pittsburgh; H. W. Croft and Hamilton Stewart, of the Harbison-Walker Refractories Company; H. B. Rust, C. J. Ramsburg and W. F. Rust. The officers of the Pittsburgh By-Product Coke Company and the H. Koppers Company are the same.

The Pittsburgh By-Product Coke Company will complete about April 15 a plant of 110 Koppers by-product ovens on the west side of the Hackensack River, near Jersey City, N. J., which will also comprise a benzol recovery plant. It will deliver coke to the New York Consolidated Gas Company, Brooklyn Gas Company and the Public Service Corporation, and has also a long-time contract for furnishing gas to the latter company. It will also produce high-grade foundry coke. The same company is also building at St. Paul, Minn., a Koppers by-product plant of 65 ovens, which is expected to be completed about August 1. The gas will be sold to the St. Paul Gas Company, and the plant will also make domestic and foundry coke. The Pittsburgh By-Product Coke Company also owns and operates the benzol plant of the Camden Coke Company, Camden, N. J.; a benzol plant at Washington, D. C., in connection with the Washington Gas Light Company, and on Feb. 10 started a benzol plant at Newark, N. J.

The H. Koppers Company is at present building three benzol plants, two for the People's Gas Light & Coke Company, Chicago, and one for the Public Service Gas Company of Illinois, at Evanston. The plant of 94 Koppers ovens under erection by the H. Koppers Company for the LaBelle Iron Works, Steubenville, Ohio (on the opposite side of the Ohio River, in West Virginia), is expected to be finished and put in operation on Monday, Feb. 26. It will furnish coke for the LaBelle furnaces at Steubenville, and will also be equipped for the recovery of benzol, sulphate of ammonia, etc.

Pennsylvania Industrial Physicians' Conference

A large number of physicians connected with the iron and steel industry in Pennsylvania attended the fourth annual conference of industrial physicians conducted by the Pennsylvania Department of Labor and Industry at Harrisburg, Friday, Feb. 16. Among the companies represented were the Donaldson Iron Company, Alanwood Iron & Steel Company, Baldwin Locomotive Works, Carnegie Steel Company, Solway Process Company and Semet-Solvay Company, American Car & Foundry Company, Youngstown Sheet & Tube Company, Pittsburgh Steel Foundry Company and Adrian Furnace Company. There was also in attendance Thomas Darlington, New York City, American Iron and Steel Institute. The conference indorsed the amendments to the workmen's compensation law proposed by the Medical Society of the State of Pennsylvania and by the legislative conference of the medical profession of the State that the period of disability for medical attention, which now is fixed at 14 days, be changed to 30 days; that the date of disability be dated from the time the patient reports to the physician, the surgeon, or hospital for medical or surgical treatment; that the maximum compensation shall be changed from \$75 to \$200 and that the words "major operation" be stricken from the act.

A Record Naval Appropriation

WASHINGTON, D. C., Feb. 20, 1917.—The Senate Committee on Naval Affairs has reported the naval appropriation bill carrying the unprecedented sum of \$531,000,000, an increase of \$163,000,000 over the bill as passed by the House. This increase is largely due to the inclusion in the bill of an appropriation of \$150,000,000 recommended by the Secretary of the Navy with the approval of the President to enable the Administration to speed up construction on naval vessels already authorized. A similar provision was recommended by the House Naval Committee, but was rejected by the House. In view of the critical status of our foreign relations it is believed this provision will be accepted by the conferees of the two houses and will be made immediately available.

With the special fund to hasten construction provided by the bill, as reported, the Navy Department will be able to arrange for double and triple shifts in the navy yards and in the private plants where war vessels are being built, subject, of course, to labor market conditions. Under the terms of existing law the Department can pay a bonus of 20 per cent for speedy construction, and with the blanket authority conferred by the pending bill it is assumed that these bonuses could still further be increased in the discretion of the President.

The Senate Committee adopted an emergency clause constituting eight hours the standard of a day's work, but waiving, in any emergency, the restrictions of the eight-hour law, stipulating, however, that overtime shall be paid for on the basis of time and a half.

W. L. C.

The Standard Sanitary Mfg. Company, manufacturer of plumbing supplies and allied products, has acquired control of the L. M. Rumsey Mfg. Company, St. Louis, large manufacturer of similar products, the transaction being handled by Louis Ahrens and Samuel Moon for the Standard Company. It is understood that the St. Louis plant will be operated in conjunction with the Ahrens & Ott Mfg. Company, Louisville, Ky., another of the allied subsidiaries of the Standard Company. The purchase of the Rumsey Company includes all its property except its office and headquarters building, which, however, has been leased. The Rumsey Company was organized more than 50 years ago and has grown steadily to large proportions, carrying a stock on hand at all times in excess of \$1,000,000.

The Mid-Nation Iron Products Company, recently organized with a capital of \$2,000,000, has begun preparations for the erection of a blast furnace at St. Louis and also for the development of about 25,000 acres of iron-ore lands in Wayne and Butler counties, Missouri. It also has in contemplation plans for the sale of iron ore to other furnaces. Of the holdings controlled about 15,000 acres are proved ore-bearing land with an estimated deposit running into millions of tons. With a new short railroad it is expected to utilize the Mississippi River, with barges, for the transportation of the ore. Earl A. Clemons, of Chicago, is president.

The Biggs-Watterson Company, Cleveland, recently booked the following orders for Champion electric traveling cranes: Eight 15-ton for the Erie, Pa., works of the General Electric Company; five 10-ton for the Standard Shipbuilding Company, New York; two 15-ton for the Erie City Iron Works, Erie, Pa., and orders for single cranes for the Phillips Sheet & Tin Plate Company, Weirton, W. Va.; Colonial Steel Company, Pittsburgh; Aluminum Company of America, Pittsburgh, and Falls Clutch & Machinery Company, Cuyahoga Falls, Ohio.

The George F. Smith Contractors' Equipment Company, St. Louis, has leased larger quarters and will remove from 810 North Main Street, to the corner of Franklin Street and Channing Avenue, where it will occupy about 50,000 sq. ft. of space in a two-story building. The company handles contractors' equipment and machinery exclusively. A repair and service department will be installed.

J. G. Brill Company's Year

A net surplus of \$1,146,193 was earned by the J. G. Brill Company, Philadelphia, Pa., and its subsidiaries for the year 1916, after deducting regular quarterly dividends at the rate of 4 per cent per year on the preferred stock, amounting to \$183,000. To the total surplus account for 1915 of \$1,247,982 were added net profits for the year 1916 of \$93,257, and deductions were made for adjustments of \$11,846. The combined output for the year 1916 amounted in sales value to \$6,180,896, against \$4,403,116 in the previous year.

The resumé of business conditions encountered by the company in 1916, as set forth in the report of the president, Samuel M. Curwen, is summarized as follows: The general business of electric car and car truck manufacturing improved during the year, but it was not nearly sufficient in volume to meet the normal capacity of all the concerns engaged in the industry and consequently it did not lessen very materially the severity of competition. The cost of all raw materials, the difficulty in obtaining their prompt delivery at any price, and the great scarcity and continuous increase in the cost of labor obtaining throughout the year also seriously affected the ability of the management to execute its orders at satisfactory costs and within reasonable and profitable time. The principal orders for projectiles on hand at the beginning of 1916 resulted in far less profit than anticipated, largely due to the fact that the sub-contractors for material and for machining and completing shells from forgings made by the company, failed to meet their engagements, which resulted in the cancellation by the purchasers of the unfinished portions of these contracts. While settlements on these yielded some profit, it was not sufficient to affect materially the general results for the year.

The following is a comparison of the amount of combined work on hand as of Feb. 9, 1917, with the work on hand Feb. 5, 1916:

	1917	1916
Cars, trucks, parts and miscellaneous material	\$3,858,988	\$2,058,918
Projectiles	613,766	2,741,197
Total	\$4,472,754	\$4,800,115

Lackawanna Steel's 1916 Earnings

The income account of the Lackawanna Steel Company for the year ended Dec. 31, 1916, shows a rate of profit of 34.81 per cent earned on \$35,096,500 of common stock outstanding; this is an actual increase in profits over the year 1915 of \$9,809,126.76. The rate of profit for the third quarter of last year was 35.20 per cent and of the second quarter 35.31. Unfilled orders on Dec. 31 amounted to 811,126 tons, or 1554 tons less than on Dec. 31, 1915, but the amount of unfilled orders on Feb. 12, 1917, was 1,032,651 gross tons. The comparative statement for 1915 and 1916 is as follows:

	Income Account for the Year 1916	1916	1915	Increase
Total net earnings after deducting all expenses, including ordinary repairs and maintenance	\$16,090,858	\$5,977,469	\$10,113,388	
Deduct:				
Interest on bonds and notes:				
Lackawanna Steel Co.	\$1,445,194	\$1,633,283	\$188,089	
Subsidiary companies	303,317	309,900	6,583	
Rents and royalties	101,536	101,536		
Balance	\$14,240,811	\$3,932,750	\$10,308,061	
Less:				
Appropriations:				
For extinguishment of mines and mining investments	368,730	313,115	55,615	
For depreciation and accruing renewals	1,653,547	1,210,528	443,319	
Profit for the year	\$12,218,234	\$2,409,107	\$9,809,127	

*Decrease.

A book entitled "Increasing To-day's Profits" has been published by the engineering department of the Diamond Power Specialty Company, builder of soot blowers for boilers, Detroit, Mich. A chapter covering "A Little Course in Bookkeeping," shows what it costs to allow a boiler to become clogged with soot and dust.

GERMANY'S MANGANESE SUPPLY

Failure of All Substitutes for Ferromanganese— Use of Calcium Carbide

BY FRANK JOVIC

With reference to the very interesting analysis of the ferromanganese question in Germany, published in THE IRON AGE, Dec. 28, 1916, the following statement of facts may help to clear the situation:

Owing to the complications in the manganese ore trade previous to the war, statistics are not clear and give no reliable information. Official data stop with 1913 and the heavy shipments of the first half of 1914 are not recorded. The fact that most of the ore was unloaded either in Antwerp or in Rotterdam makes all figures unreliable, because from those ports they were sent either to Belgium, French Lorraine, German Lorraine, Luxemburg or Westphalia, both by boat and by rail, passing and often repassing the different border lines.

One thing is indisputable, Germany is very short of manganese, and all substitutes have failed to give as satisfactory results in spite of the assertions in the daily press. This is emphasized by the commandeer silence on the question of steel quality and the high price the German iron works are willing to pay for high-grade manganese ore. The substitutes that were tried out and disappointed many chemists were more costly and yielded such poor results that ferromanganese percentage is still the most used recarburizer of steel.

The greatest hopes were based on calcium carbide, CaC_2 . Everybody knows this stone-like solid, which is used extensively in the manufacture of acetylene gas. From the chemical standpoint all the properties of this compound indicated a substitute for the ferromanganese. In fact, CaC_2 is inflammable, infusible and non-explosive; it can be manufactured in any quantities out of limestone and coal, and is sold at the very reasonable price of \$70 per ton. Made in the electric furnace with considerable absorption of heat, it is one of the most energetic reducing agents known; it dissociates even water, yielding C_2H_2 and CaO . It contains carbon, a hardener.

Thus it seems that both elements of calcium carbide could be active in the deoxidation and recarburization period in the manufacture of steel. The calcium splits up iron oxide into its elements, leaving the iron and forming CaO , a slag easily rising out of the bath. The carbon, which alloys with the iron, gives the right composition. Furthermore, being generated endothermically, CaC_2 gives heat to the bath in dissociating—a favorable effect, making the bath more fluid, helping the reaction, the expelling of gas and separation of CaO .

The use of calcium carbide has been recognized at regular intervals by inventors, even at times when its price was higher than that of ferromanganese. I refer to United States patents No. 868,610 and No. 1,081,532, and others as far back as 1907.

In spite of all these apparently favorable conditions, CaC_2 failed to give results in persistent tests, made on a large scale during many months. The main reason is the action of the calcium on iron. Calcium is all right for deoxidation, but inert to iron; it is indifferent. Manganese, on the contrary, besides its deoxidizing effect on the molten bath, alloys with the iron, hardens the metal, improves its quality and thus promotes the easy operation so universally used to-day. Furthermore, that metal is easily marketed in all grades, ranging from 10 to 80 per cent manganese, to satisfy any condition.

Greater success seems to be secured by the use of thermit-aluminum products, advertised previous to the war, although their use necessitates caution and is far from general.

It does not seem probable that the end of the war will surprise the world with great discoveries in the line of substitutes. The price of above \$150 a ton for ferromanganese makes anywhere a promising substi-

tute very profitable. The war only emphasizes one thing—that the products on which the iron industry previous to the war were based were sound and thoroughly tested by the sharp world-wide competition of the long peace period previous to the war. Then, too, chemists and engineers were busy to lower the manufacturing cost and promote efficiency. Laboratories as well as universities were eagerly at work to investigate all possible chances of new materials and products.

Fortunately or unfortunately, as one will have it, these raw products do not recognize in their distribution the principle of the nationalities.

The Steel Corporation Dissolution Suit

WASHINGTON, D. C., Feb. 20, 1917.—The Attorney General, on Feb. 16, filed the Government's brief in the United States Supreme Court in the action against the United States Steel Corporation under the anti-trust laws, which has been set for argument on March 6. Attention is drawn in the brief to the fact that the Government is not seeking a dissolution decree at the hands of the Supreme Court, but merely a remanding of the case to the United States District Court of New Jersey with instructions to that tribunal to work out a dissolution plan.

The Attorney General's argument is directed chiefly to the reasons given by the court below for refusing to dissolve the trust on the ground that it is not an actual monopoly and does not control prices. It is contended that at the time the corporation was organized the units taken in controlled from 85 to 90 per cent of the existing industry and that soon thereafter there was a substantial increase in prices which obviously was one of the objects sought by the consolidation. The basis upon which the various units were brought into the corporation, the Government contends, was not actual value figured upon output and physical property, but rather the "value to the trust of the cessation of competition." Throughout the brief the Attorney General insists that the court shall regard not so much conditions existing to-day or at the time the suit was filed as the obvious purpose of the consolidation and the advantages sought to be gained by uniting competing establishments under a single management.

W. L. C.

Manganese Ore from Costa Rica

A manganese ore mine is operating in Costa Rica and began shipping ore in May, 1916. Its output now is about 300 tons per month and the ore has an average manganese content of 55 per cent. The company is making preparations to install an equipment of docks, etc., with a capacity of 3000 to 5000 tons per month, to be ready about July 1, 1917. Its port will be about two miles south of Braxilito on the Pacific side. The plant is at Playarreal, Guanacaste, Costa Rica.

Ferromanganese Imports in January

Imports of ferromanganese into the United States in January, according to Government data furnished THE IRON AGE, were 6011 gross tons against 4401 in December, 1916. The monthly average in 1916 was 6570 tons. The January imports were received as follows: 3943 tons through Baltimore, 923 tons through Philadelphia, 861 tons through New Orleans and 284 tons through Norfolk.

Dr. William B. Phillips, former director of the Bureau of Economic Geology and Technology, Austin, Tex., who has completed an investigation of the graphite deposits of Burnet and Llano counties in that State, says these deposits are of an extraordinary character with respect to quantity and quality. The graphite is of the crystalline variety, occurring in flakes in the older schists and gneiss of the central mineral region. The Texas crude material is claimed to run higher in value than that found elsewhere in this country and furthermore is almost free from black mica.

Book Reviews

Pipe and the Public Welfare. By R. C. McWane, New York City. Pages 165; 5 x 7½ in., illustrated. Published by the Stirling Press, 318 West Thirty-ninth Street, New York. Price \$1, net.

After perusal of this small but comprehensive book, which is dedicated to "the men who are responsible for the installation of conduits that are to be used not only for the present but for future generations," the reader can only conclude that the writer presents a convincing argument for the use of cast-iron pipe for water and gas mains, thereby fulfilling his purpose. Mr. McWane, who has had a long experience in the pipe trade, draws from a great many sources and authorities to prove his contention that cast iron, for the purposes named, is superior to wrought iron or steel in conduits which are exposed to corrosion, electrolysis or other deleterious action, except, perhaps, for very high pressures or for temporary use or where the initial cost of cast-iron pipe cannot be met, as stated by one of the authorities quoted. The book is in four chapters, namely: Historical; Materials and Methods of Making Metal Pipe; Technical and Historical Data on Metal Pipe Deterioration, and Wood Pipe. The author's condensation of the historical side of his subject is entertaining as well as instructive, as, indeed, is the entire book. Briefly, he sketches the common processes in making iron and steel to give his readers a better understanding of the contentions to follow.

Custom House Guide. Pages 304, 5 x 6½ in. Published by H. D. Chapman, 14 Reade Street, New York City. Price \$1.

This book, which is now in its thirty-fourth edition, is a guide for the use of all persons having business to transact with the Custom House. A directory of the Customs forces at the port of New York is given, together with the location of general order stores and warehouses and steamship lines and piers. Considerable export and import information is given, together with the legal rates of storage, labor and cartage on unclaimed goods, tables of foreign currencies, weights and measures adopted to customs purposes, etc.

A hand-book of commercial information in regard to the United States entitled "Industrial America," has been issued by the American-Russian Chamber of Commerce, 60 Broadway, New York City. The book, containing a selected classified directory of 2500 American firms interested in the Russian market, has been printed in Russian and will be distributed under the joint auspices of the American-Russian Chamber of Commerce in New York and the Russian-American Chamber of Commerce in Moscow, to approximately 5000 reliable and responsible Russian business firms. The book, which comprises 450 pages, is edited by E. C. Porter, executive secretary of the American-Russian Chamber of Commerce, and A. J. Sack, staff correspondent for the official publications of the Russian Ministry of Finance. To facilitate Russian purchasing, a notice is made for those firms in Russia unfamiliar with the English language that correspondence can be addressed in Russian to the American-Russian Chamber of Commerce and this correspondence will then be translated and forwarded to the American firms.

The American Uniform Boiler Law Society, Erie, Pa., has issued a condensed report of the American Uniform Boiler Code Congress held in Washington, D. C., Dec. 4 and 5, 1916. The report, which comprises 85 8½ x 11-in. pages, gives stenographic reports of the speeches and resolutions presented. Among those who were represented and whose addresses are quoted in full are the Hon. T. J. Duffy, Industrial Commission of Ohio; Dr. F. R. Hutton, vice-president American Museum of Safety; Prof. L. P. Breckenridge, Yale University; J. C. McCabe, chief boiler inspector, Detroit; D. M. Medcalf, Ontario; Henry Hess, Philadelphia; Edward N. Hurley, late chairman the Federal Trade Commission, and others. The Congress adopted resolutions recommending the universal adoption of the American Society of Mechanical Engineers' boiler code.

Webb Bill Amended Still Further

WASHINGTON, D. C., Feb. 20, 1917.—The Webb bill, legalizing export combinations for the development of foreign trade, has been reported to the Senate by the Committee on Interstate Commerce with amendments of the most comprehensive character, including a series of far-reaching provisions framed by Senator Pomerene, of Ohio, a leading member of the committee, who was unwilling to agree to a favorable report until the bill had been so safeguarded as to prevent the operations of export combinations from affecting domestic commerce. While the bill, as reported, contains restrictions which are not welcomed by the advocates of this legislation, nevertheless they are disposed to accept it and every effort is being made to bring the measure to a vote and to secure the concurrence of the House in the amendments before the adjournment of Congress on March 4. The refusal of the managers of the revenue bill to permit the Webb measure to be added as a "rider" will make it difficult to pass the Webb bill, but every parliamentary resource will be exhausted in the attempt to put it through.

W. L. C.

Large Orders for Locomotives

Orders for locomotives in the past two weeks have been 283. The Illinois Central has bought 40 from the American Locomotive Company and 35 from the Baldwin Locomotive Works. The American Locomotive Company has also taken orders for 40 Mikados for the Northern Railway of Spain, 20 Mikados for the Chicago & Northwestern and 16 locomotives for the Elgin, Joliet & Eastern. The Baldwin Locomotive Works will build 15 Mikados for the Northern Railway of France and 19 locomotives for the Texas & Pacific and has booked numerous small orders. The Seaboard Air Line, instead of ordering 30 locomotives from the American Locomotive Company as previously announced, has bought 16 Mallets from that company and 10 Santa Fés from the Baldwin Locomotive Works. The Canadian Pacific will build 25 locomotives in its own shops. The principal inquiries include 35 from the Chicago, Burlington & Quincy and 5 from the Belt Railroad of Chicago. It is estimated that the total locomotives ordered in 1917 to Feb. 17 inclusive is 998, of which 807 were ordered in January and 191 in February. Of this total 227 were for export.

Interstate Foundry Company Organized

The Interstate Foundry Company, Cleveland, which recently passed into the hands of new owners, has completed its organization by the election of M. C. Rosenfelt, president; F. B. Whitlock, vice-president and general manager; L. A. Murfey, treasurer, and C. A. Trathen, secretary and assistant treasurer. Under the old organization Mr. Whitlock was treasurer and general manager. The company will enlarge its plant by extensions to its heavy shop that will include a cleaning room and core room, these additions being required to balance the shop. It is the intention, however, to gradually discontinue the manufacture of heavy castings, turning the entire plant into a light shop, particularly for the manufacture of automobile castings.

An apparatus for controlling electric furnaces, particularly the arc type, by connecting the electrode or electrodes with a mechanism actuated by an electric motor has been patented (U. S. 1,206,603) by John A. Seede, Schenectady, N. Y., and assigned to the General Electric Company. The motor is controlled through relays by a circuit-closing magnet responsive to variations of power in the furnace circuit. A switch is also provided for automatically disconnecting the control apparatus, thereby stopping the motor, when the voltage of the furnace supply current falls below the value to which the apparatus is adjusted.

The payroll of the South Bethlehem plant of the Bethlehem Steel Company for January aggregated \$2,617,000, being one of the largest in the history of the company. The money was distributed among approximately 26,000 employees.

Iron and Steel Markets

MORE PRICE ADVANCES

Effort Centered in Moving Freight

France Takes Rails in 1918—Domestic Shipyards Sounding for Plates in 1919

With the worst railroad tangle known and scores of men from the largest manufacturing concerns trying to ferret out cars containing raw materials for their works, it is not surprising that a spot market, with numerous higher prices, has developed in steel as well as in iron. Tightness of order books has not allowed for a big volume of such business and the condition seems not likely of long duration.

Pig iron is stronger both for prompt and last-half sales. Foundry iron has been marked up 50c. and \$1 per ton. Malleable iron is \$1 higher, and low-phosphorus and charcoal irons are quoted \$2 above last week's figures. Business has been done in charcoal iron at \$40 at furnace, and in low-phosphorus iron at \$60. Basic iron has firmed up; all told, in the Pittsburgh district probably 35,000 tons were sold at \$30 and better at furnace. Bessemer iron is scarce, with an inquiry for 15,000 tons for Italy unsatisfied.

Spot business in iron was somewhat temporary, owing to the quick realization on the part of consumers that deliveries were uncertain. The situation took a twist in that consumers near producers found they could secure iron held up by embargoes. Parallel instances have also occurred in a shift of steel from embargoed purchasers to plants near producers.

The somewhat milder weather has brought a betterment in operating conditions. Of fifteen banked furnaces of the Steel Corporation in the Pittsburgh district, six went back into operation in the last two days. Lack of steel as well as natural gas has, however, kept down some finishing mills.

Much is expected from the co-operation promised between the railroads and the Government, growing out of the conference in Washington. Lack of terminal facilities, particularly at seaboard points, has long been a recognized weakness, but it can hardly be charged as causing the present jam all over the country. With the few exceptions which have had great publicity, movement of ocean vessels is substantially as regular as ever. Under an arrangement of some months' standing products under certain contracts have been stored at terminals, thus to relieve cars. Several feet of snow over tracks and inadequacy of locomotive power are the true explanation of such conditions as 18,000 cars stalled on the tracks of one line between Pittsburgh and Buffalo.

General export business since the first of the year has dropped off about one-half, largely because of high ocean transportation costs. The largest item of the week covers 50,000 tons of rails, which France is willing to take in 1918. Russia is in the market for 100,000 tons of barb wire for shipment before July, and some of this has apparently already been placed.

The plate situation can hardly better be emphasized than by mentioning that domestic shipyards are now sounding mills for delivery of material in the first part of 1919. Even ordinary quality of tank plate for the best shipments is now 5c. per lb., Pittsburgh basis, though any volume which has been done in the last few weeks at 1/4c. to 1/2c. less has not been large. There is a new British inquiry of upward 40,000 tons of ship plates, possibly for Japan, and taking about 10,000 tons in ship shapes, and all of the 20,000 tons for France has not been placed. A Staten Island shipbuilder wants 15,000 to 20,000 tons for the second and third quarters of this year.

Locomotive buying in the last two weeks has been heavy, approaching 300, of which 75 are to go to the Illinois Central. In the first seven weeks of the year 998 locomotives were put under contract, less than one-quarter of which are for export. Steps for betterment and extensions of shops for motive power and rolling stock are also evidenced by late machinery inquiries; such have come from the Grand Trunk, the Delaware & Hudson and the New York Central.

Railroad bridge letting has been conspicuous. About 25,000 tons were put under contract in the last week, in addition to 7000 tons for the New Haven's 1917 bridge necessities, which is practically closed. All of 6000 tons is pending. Freight terminals for the Philadelphia & Reading will take 3000 tons. In rails some 17,000 tons have been sold to various roads by the Steel Corporation, and taking their places in mill schedules, they are undoubtedly for late 1918 deliveries.

A great scarcity is developing in ferrosilicon, and the 50 per cent alloy has sold at \$250 for June delivery. Following an advance by British makers in ferromanganese, the domestic product is higher, ranging from \$300 for spot delivery to \$250 for the last quarter. Manganese ore has sold at 80c. per unit, a record price.

Pittsburgh

PITTSBURGH, PA., Feb. 20, 1917.

The car situation yesterday and to-day is stated to be slightly better, but it is still very bad. The supply of fuel is also a dominant factor in the situation, and with these two conditions steel makers are having troubles of their own in getting out material and shipping it when it is ready. At this writing the Carnegie Steel Company has 12 blast furnaces out of blast for relining and repairs, while 8 are banked, leaving only 39 in operation. In the two valleys and in the Pittsburgh district blast furnaces are running with only 48 to 72 hours' coke supply, and some less. As an instance of the bad car situation, a local fabricator recently had 12 cars of structural material in the Youngstown yards for more than a week before an engine could be secured to switch them into the receiving yards of the customer. There is a famine in the supply of fuel, many plants running short-handed and others being compelled to shut down for two or three days at a time waiting for coal to arrive. Natural gas has been shut off at many plants, and this makes the situation worse. The output of pig iron and of semi-finished and finished steel in February is

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

	Feb. 21.	Feb. 14.	Jan. 24.	Feb. 23.
Pig Iron, Per Gross Ton:	1917.	1917.	1917.	1916.
No. 2 X, Philadelphia...	\$32.00	\$31.50	\$30.50	\$20.00
No. 2, Valley furnace...	33.00	33.00	31.00	18.25
No. 2, Southern, Cin'ti...	27.40	26.90	25.90	17.90
No. 2, Birmingham, Ala...	24.50	24.00	23.00	15.00
No. 2, furnace, Chicago*	33.00	32.00	30.00	18.50
Basic, del'd, eastern Pa...	30.50	30.50	30.00	19.50
Basic, Valley furnace...	30.00	30.00	30.00	17.75
Bessemer, Pittsburgh...	35.95	35.95	35.95	20.70
Malleable Bess., Ch'go*	33.00	32.00	31.00	19.00
Gray forge, Pittsburgh...	31.95	31.95	29.95	18.45
U. S. charcoal, Chicago...	35.75	33.75	31.75	19.75

	Feb. 21.	Feb. 14.	Jan. 24.	Feb. 23.
Sheets, Nails and Wire,	1917.	1917.	1917.	1916.
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh	4.75	4.75	4.50	2.60
Sheets, galv., No. 28, P'gh	6.75	6.50	6.25	4.75
Wire nails, Pittsburgh...	3.00	3.00	3.00	2.30
Cut nails, Pittsburgh...	3.70	3.70	2.95	2.20
Fence wire, base, P'gh...	2.95	2.95	2.95	2.15
Barb wire, galv., P'gh...	3.85	3.85	3.85	3.15

Old Material, Per Gross Ton:

Iron rails, Chicago...	\$27.00	\$27.00	\$27.00	\$17.25
Iron rails, Philadelphia...	28.00	28.00	28.00	19.50
Carwheels, Chicago...	18.00	18.00	18.50	13.50
Carwheels, Philadelphia...	20.50	20.50	21.00	16.50
Heavy steel scrap, P'gh...	21.00	22.00	23.00	17.00
Heavy steel scrap, Phila...	20.00	20.00	21.00	16.50
Heavy steel scrap, Ch'go...	22.00	21.75	21.00	14.75
No. 1 cast, Pittsburgh...	19.00	19.00	19.00	15.25
No. 1 cast, Philadelphia...	20.00	20.00	20.00	17.00
No. 1 cast, Ch'go (net ton)	16.00	15.00	15.50	12.75
No. 1 RR. wrot, Phila...	25.00	25.00	26.00	21.50
No. 1 RR. wrot, Ch'go (net)	24.00	24.00	23.50	14.75

Rails, Billets, etc., Per Gross Ton:

Bess. rails, heavy, at mill	38.00	38.00	38.00	28.00
O. h. rails, heavy, at mill	40.00	40.00	40.00	30.00
Bess. billets, Pittsburgh...	65.00	65.00	65.00	35.00
O. h. billets, Pittsburgh...	65.00	65.00	65.00	35.00
O. h. sheet bars, P'gh...	65.00	65.00	65.00	35.00
Forging billets, base, P'gh	90.00	85.00	80.00	55.00
O. h. billets, Phila....	70.00	60.00	60.00	42.00
Wire rods, Pittsburgh...	80.00	75.00	75.00	50.00

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

bound to show a heavy falling off as compared with January. Railroad embargoes are on in every direction, but pig iron and steel originally routed to some of the plants against which embargoes have been declared have been released and sold to local consumers, which has helped out this district very much. Prices are extremely firm on everything and on sheets have advanced fully \$5 per ton on some grades. As high as \$12 per net ton has been paid for furnace coke and \$13 and \$14 for foundry coke for prompt shipment. There is also a famine in the supply of ferrosilicon, and it has sold in small lots for prompt shipment at as high as \$250 per ton. Large export orders for pig iron and steel are being offered to local producers, which they are turning away, as they cannot get cars and also prefer to distribute their output to domestic consumers.

Pig Iron.—The past week in the local pig iron trade has been very active. The railroad embargoes that exist in every direction have released large quantities of Bessemer, basic and foundry iron intended for shipment out of this district, and some of the plants that were to receive it are embargoed, and the iron has been released to local consumers. We note one sale of 10,000 tons of basic iron for fairly prompt delivery at \$30 at furnace, to go to a nearby open-hearth steel plant; also 3000 tons at the same price, and 3000 tons at the reported price of \$31, Valley furnace. The Central Steel Company, Massillon, Ohio, has bought 5000 tons of basic at \$30 at furnace, and the United Steel Alloy Corporation, Canton, Ohio, has bought a similar amount or more, also at \$30, Valley furnace. There have been smaller sales of basic iron, and the aggregate sold in the past week was probably 35,000 tons. Sales of Bessemer iron have been limited, as it is very scarce. Small lots ranging from 100 to 500 tons have been sold at as high as \$36, Valley furnace. There is a heavy inquiry for foundry iron for the last half, and several sales of Southern No. 2 for delivery in this district in the last half have been sold at \$25, Birmingham, equal to \$29.54, delivered in the Pittsburgh district. Inquiry from Italy and France for malleable Bessemer and low phosphorus iron is quite

heavy, but local producers are turning these down as they do not have the iron to spare. One inquiry from Italy was for 15,000 tons of Bessemer, another for 9000 tons and several for smaller quantities, one for about 10,000 tons of malleable Bessemer and others for 2000 to 3000 tons of low phosphorus. Prompt foundry iron for consumers who have contracts, but are not getting deliveries, has sold at \$36 to \$37 at furnace. For last half of the year No. 2 foundry is quoted from \$33 up to \$35 at furnace. We quote standard Bessemer iron, \$35 to \$36; basic, \$30 to \$31; gray forge, \$31 to \$32; malleable Bessemer, \$31 to \$32, and No. 2 foundry, \$33 to \$36, prices on the latter depending on the deliveries wanted and the quantity, and all at Valley furnace, from which the freight rate to Pittsburgh or Cleveland is 95c. per ton.

Billets and Sheet Bars.—Some semi-finished steel in the shape of billets and sheet bars intended for shipment to consumers outside the Pittsburgh district has been released, owing to railroad embargoes, and has been resold to local consumers. One such sale was 7000 to 7500 tons of 4-in. open-hearth billets, ordinary sizes, at \$65, maker's mill, for shipment up to July 1, and another was 2000 tons of Bessemer billets, ordinary carbons and sizes, also at \$65, maker's mill. Deliveries of billets and sheet bars by the mills are slow as their output has been cut down materially by shortage in fuel, and their shipments by inability to get cars. Some sheet mills have open orders out to buy sheet bars at \$65, maker's mill, but have been able to pick up only a very limited quantity. Sales of forging billets for delivery up to July are reported to have been made at \$90, or above, f.o.b. Pittsburgh. We quote soft Bessemer and open-hearth billets and sheet bars at \$65 to \$70 per ton, maker's mill, Pittsburgh or Youngstown; forging billets, \$90 to \$95 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25.

Ferroalloys.—There has been another sharp advance in the price of domestic 80 per cent ferromanganese for prompt shipment, carload lots having been sold here in the last few days at \$300 per ton, f.o.b. furnace. Most consumers are covered up to July, and

Coke, Connellsville, Per Net Ton at Oven:

Furnace coke, prompt...	\$12.00	\$10.00	\$8.50	\$3.50
Furnace coke, future...	7.00	7.00	6.00	2.50
Foundry coke, prompt...	13.00	11.00	10.00	3.50
Foundry coke, future...	8.00	8.00	7.00	3.25

Metals,

	Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	36.00	34.50	31.00	27.37 1/4	
Electrolytic copper, N. Y.	36.00	34.50	31.00	27.25	
Spelter, St. Louis	10.50	10.50	9.87 1/2	21.25	
Spelter, New York	10.75	10.75	10.12 1/2	21.50	
Lead, St. Louis	9.25	8.90	7.62 1/2	6.32 1/2	
Lead, New York	9.50	9.00	7.75	6.30	
Tin, New York	48.75	53.00	45.50	42.20	
Antimony (Asiatic), N. Y.	30.00	30.00	15.00	44.00	
Tin plate, 100-lb. box, P'gh	\$7.50	\$7.50	\$7.00	\$4.00	

the demand has quieted down. The price of English 80 per cent ferromanganese for the last half has been fixed at \$185, seaboard, and it is claimed contracts have been closed at that figure. There is still a famine in the supply of ferrosilicon, and small lots of 50 per cent for prompt shipment are reported to have been sold at \$225 to \$250 per ton. The bill allowing the leading producer of ferrosilicon to get more power on the American side of Niagara Falls, N. Y., has become a law, but is not yet operative, as the Niagara River is frozen up and the output of this producer is less than half what it should be. Prices on manganese ore are advancing heavily, and the difficulties in getting them from Brazil and also from Cuba are increasing. We quote domestic 80 per cent ferromanganese for prompt shipment at \$275 to \$300 per ton at furnace and English 80 per cent at \$185, seaboard, for last-half delivery. There is a scarcity of spiegel-eisen, and prices are higher. We quote 18 to 22 per cent spiegel-eisen at \$65 to \$70 and 25 to 30 per cent at \$75 to \$85, delivered. We quote 9 per cent Bessemer ferrosilicon at \$45 to \$46; 10 per cent, \$46 to \$47; 11 per cent, \$47 to \$48; 12 per cent, \$48 to \$49; 13 per cent, \$49.50 to \$50.50; 14 per cent, \$52; 15 per cent, \$54, and 16 per cent, \$56. We note a sale of 600 tons of 10 per cent for the last half of the year at \$47 at furnace. We quote 7 per cent silvery iron at \$32 to \$33; 8 per cent, \$32 to \$33; 9 per cent, \$33 to \$34; 10 per cent, \$34.50; 11 and 12 per cent, \$36.50. These prices are all f.o.b. at furnace, Jackson or New Straitsville, Ohio, and Ashland, Ky., all of which have a uniform freight rate of \$2 per gross ton to the Pittsburgh district.

Structural Material.—The new inquiry in the past week has been active and some large jobs have been placed. The American Bridge Company has taken 1000 tons for the Sixty-seventh Street bridge of the Pennsylvania Lines West at Chicago, and 1000 tons for an addition to the McKelvey department store at Youngstown, Ohio. The McClintic-Marshall Company has taken 1500 tons for the Sixty-fifth and Sixty-eighth Street bridges of the Pennsylvania Lines West at Chicago, and the Fort Pitt Bridge Works the Sixty-third and Sixty-ninth Street bridges, 1500 tons. The McClintic-Marshall Company has also taken 450 tons for a new building for the D. L. Clark Candy Company, Pittsburgh, and is the low bidder on 7500 tons of steel for two crane runways in the Norfolk Navy Yard. This work, however, will not be placed until the money is appropriated by Congress. The American Bridge Company, through the United States Steel Products Company, is low bidder on the pier sheds and other structural works in the Panama Canal Zone requiring about 7000 tons. This company bid 5.02c. per lb., the McClintic-Marshall Company 5.43c. and the Bethlehem Steel Company 5.75c. Plans for the new plant for the Kelly Springfield Tire Company, Cumberland, Md., will be revised and the steel, about 7000 tons, will not be placed for some time. The Penn Bridge Company, Beaver Falls, Pa., has taken 425 tons of steel for an ore-handling bridge for the Farrell works of the Carnegie Steel Company. The Carnegie Steel Company's price on beams and channels up to 15 in. is 3.25c. at mill, with no promise of delivery, while the Jones & Laughlin Steel Company is quoting 3.25c. and higher, for such delivery as it can make, which would not be before late this year. Small lots of beams and channels from warehouse are quoted at 4c. up to 5c., depending on quantity.

Plates.—It is hard to find a mill that has room for any more plate orders for delivery prior to July. The new demand for steel cars is quiet, no large orders having been placed in this market for some time. However, the pressure on the plate mills for material for shipyards and other manufacturing plants is still enormously heavy. Export inquiry is very active, and local plate mills are turning down business nearly every day. The Carnegie Steel Company is sold out on plates for this year, and the Jones & Laughlin Steel Company is about in the same condition, but has some universal plates for late in the year delivery. We quote $\frac{1}{4}$ -in. and heavier sheared plates at 3.75c. at

mill, with no promise of delivery, and small lots for fairly prompt shipment at 5c. and higher at mill.

Steel Rails.—Some small orders for standard sections are being placed for next year's delivery at the convenience of the mills. The new demand for light rails from the coal-mining companies is active, but little is coming from the traction lines and other consumers. We quote light rails as follows: 25 to 45 lb., \$50; 16 to 20 lb., \$51; 12 and 14 lb., \$52; 8 and 10 lb., \$53, in carload lots, f.o.b. mill, with usual extras for less than carloads. Standard section rails of Bessemer stock are held at \$38, and open-hearth \$40 per gross ton, Pittsburgh.

Sheets.—The market on sheets continues very firm. There is a particular scarcity in the supply of galvanized sheets. A recent sale of about 250 tons for January-February shipment was made at 6.75c. at mill. Some makers are asking 7c., and will not shade that price. In some cases where a consumer wants a few tons of sheets for some special work he is willing to pay a premium of \$5 a ton, or more, for fairly prompt shipment, but this is not regarded as fixing legitimate prices. The bad car situation is still having its effect, and one leading maker reports it has close to 40,000 tons of sheet and tin mill products piled up in warehouses awaiting shipment. Nearly all sheet mills are pretty well sold up to July 1, and higher prices are predicted. Specifications against contracts are active. We quote blue annealed sheets, Nos. 3 to 8, 4.75c. to 5c.; box annealed, one-pass Bessemer cold-rolled, No. 28, 4.75c. to 5c.; No. 28 galvanized, 6.50c. to 7c.; No. 28 black plate, tin-mill sizes, 4.50c. to 4.75c.; all f.o.b. mill, Pittsburgh. These prices are for carloads and larger lots, for shipment over the next two or three months. For more prompt delivery higher prices would likely be asked.

Tin Plate.—Very little tin plate remains to be sold for 1917 delivery. Several large mills are practically sold out, while others only have some for delivery in last quarter. The export demand continues heavy, mostly from India, China and Japan. There is also some recent inquiry from England. Most domestic mills are not quoting on these export inquiries, needing their entire output and more to take care of domestic customers. It is believed the price on tin plate for the last half of the year will be fixed late in March or early in April. It is said it will not be less than \$7 per base box, and may be higher. On current orders prices range from \$7.50 to \$8 per base box at mill. We quote I. C. 20 x 28, 8-lb. coating ternes at \$12 per package.

Shafting.—The current demand is fairly active, but most large consumers are covered over the first half of this year and specifications are active. Some makers of shafting are able to promise delivery on new orders in 60 to 90 days, but one leading maker reports it is sold up for about five months. Specifications from the automobile and screw stock machinery trades are particularly heavy. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots and 10 per cent off in less than carload lots for first quarter and first half, f.o.b. Pittsburgh, freight added to point of delivery.

Railroad Spikes and Track Bolts.—The new demand for spikes is quiet, but recently specifications against contracts came in very freely, with the result that some makers are filled up on all they can turn out for the next four or five months. The New York, New Haven & Hartford has an inquiry out for 10,000 kegs for delivery in the first quarter of 1918, and the Boston & Maine is inquiring for 10,000 kegs for first half of next year, while the Canadian Government has an inquiry out for about 6000 kegs for delivery from June 15 to Sept. 1 this year. Local makers say they will not quote on business for delivery so far ahead. The New York Central has yet done nothing on its inquiry made early in January for 20,000 to 25,000 kegs of spikes for delivery in the last half of this year. The new demand for track bolts is reported active and prices are firm. We quote track bolts with square nuts at 4.85c. to 5c. to railroads and 5c. to 5.25c. in small lots to jobbers, base. Railroad spikes, 9/16 in. and larger, \$3.40, base; 7/16 and $\frac{1}{2}$ in., \$3.50, base; 5/16 and $\frac{3}{8}$ in.,

\$2.75, base. Boat spikes, \$3.65, base, all per 100 lb., f.o.b. Pittsburgh.

Wire Products.—Makers report the new demand as only moderately active and specifications against contracts not coming in as freely as they did several months ago. However, mills are filled up for three or four months ahead and some are refusing to quote to others than regular customers, requiring that all prospective orders be submitted to the home office before action is taken. The recent shortage in fuel has cut down the output of wire products materially, and has put the mills further back in deliveries. For fairly prompt shipment premiums of 10c. per keg or more over the official price of wire nails could readily be obtained. Prices in effect at this writing are as follows: Wire nails, \$3, base, per keg; galvanized, 1 in. and longer, including large head barbed roofing nails, taking an advance over this price of \$2, and shorter than 1 in., \$2.50. Bright basic wire is \$3.05 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$2.95; galvanized wire, \$3.65; galvanized barb wire and fence staples, \$3.85; painted barb wire, \$3.15; polished fence staples, \$3.15; cement-coated nails, \$2.90, base, these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to the point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing are 53 per cent off list for carload lots, 52 per cent for 1000-rod lots, and 51 per cent for small lots, f.o.b. Pittsburgh.

Wire Rods.—A sale of 1000 tons of soft Bessemer or open-hearth rods for shipment to Canada is reported on the basis of \$80, f.o.b. mill, Pittsburgh. The new demand is incessant and prices quoted are governed largely by the kind of material into which the rods are to be rolled. It is impossible for small wire and wire-nail mills to buy rods at present market prices, and put them into wire nails and meet the market. In other words, wire nails are now selling at \$60 per net ton, while a gross ton of wire rods costs \$75 to \$80, and makes only about a net ton of nails or wire. There is some inquiry for high carbon rods, and very high prices have been paid. We quote soft Bessemer, open-hearth and chain rods, at \$75 to \$80, at maker's mill, Pittsburgh, but it would be difficult to place an order at the lower price.

Iron and Steel Bars.—The bulk of the business in steel bars being placed with the mills for delivery ahead is at 3c. at mill, but in some cases 3.10c. is paid. The Carnegie Steel Company is reported sold up on steel bars for all of this year, and several other large makers are sold up for the first half and have taken some contracts for the third quarter. Specifications are reported only fairly active. The new demand for iron bars is moderately good, but for reinforcing steel bars is not so active as several months ago. We quote steel bars at 3c. at mill for extended delivery, and from 3.10c. to 3.25c. for shipment in three to four months. We quote refined iron bars at 3.25c. and railroad test bars at 3.40c. in carload lots at mill.

Rivets.—Local makers report a good new demand for rivets, but most consumers are covered up to July 1. It is said that no contracts for delivery beyond that date have yet been accepted. The export demand is also active. One local maker recently shipped several carloads to Bombay and one carload to Canada. Deliveries of steel from the mills are better than for some time. Prices are firm, on less than carload lots 10c. to 15c., or more, per 100 lb., being readily paid by consumers for reasonably prompt shipment. Makers quote buttonhead structural rivets, $\frac{1}{2}$ in. in diameter and larger, \$4.25 per 100 lb., base, and conehead boiler rivets, same sizes, \$4.35 per 100 lb., base, f.o.b. Pittsburgh. Terms are 30 days net, or one-half of 1 per cent for cash in 10 days.

Nuts and Bolts.—No change has been made in prices since Dec. 20, 1916, but the market is very strong. Makers state that the new demand is excellent, but most consumers are covered to July 1. Some consumers are importuning the makers to cover them for the last half of the year, but no contracts have yet been taken so far ahead. Specifications against contracts are

heavy and deliveries of steel by the mills to local makers of nuts and bolts are better than for some time, due to the embargoes on the railroads, which allow a larger distribution of steel by the mills to local consumers. The export demand is active, but not much is doing, owing to the trouble in getting cars and vessel room. Discounts in effect, and which are stated to be firmly held, are as follows, delivered in lots of 300 lb. or more, when the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days:

Carriage bolts, small, roiled thread, 40 and 10 per cent; small, cut thread, 40 and $2\frac{1}{2}$ per cent; large, 30 and 5 per cent.

Machine bolts, h. p. nuts, small, rolled thread, 50 per cent; small, cut thread, 40 and 10 per cent; large, 35 and 5 per cent.

Machine bolts, c. p. c. and t. nuts, small, 40 per cent; large, 30 per cent. Bolt ends, h. p. nuts, 35 and 5 per cent; with c. p. nuts, 30 per cent. Lag screws (cone or gimlet point), 50 per cent.

Nuts h. p. sq. and hex., blank, \$2.50 off list, and tapped, \$2.30 off; nuts c. p. c. and t. sq., blank, \$2.10 off, and tapped \$1.90 off; hex., blank, \$2.25 off, and tapped, \$2 off. Semi-finished hex. nuts, 50, 10 and 5 per cent. Finished and case-hardened nuts, 50, 10 and 5 per cent.

Rivets 7/16 in. in diameter and smaller, 40 and 10 per cent.

Hoops and Bands.—The new demand for both hoops and bands is active and sales of hoops for forward delivery have been made at 3.75c. at mill, which is now the minimum price, and on steel bands as high as 3.25c. The Carnegie Steel Company is still quoting steel bands at 3c., with extras as per the steel-bar card, and is quoting steel hoops at 3.75c. at mill, with no promise of delivery. Other mills that can ship in four to six months are quoting higher prices. We quote steel bands for fairly prompt delivery at 3.25c. to 3.50c., and steel hoops from 3.75c. to 4c. at mill.

Cold-Rolled Strip Steel.—Most large users have covered their needs for the second quarter, but so far none of the makers has taken any contracts for delivery beyond July 1. Some have practically their entire output sold up to July. On current orders coming in for fairly prompt shipments, makers are quoting \$7.50 to \$8 per 100 lb., depending on the quantity and deliveries wanted. We quote cold-rolled strip steel for second quarter delivery at \$7 per 100 lb. Terms are 30 days net, less 2 per cent off for cash in 10 days, delivered in quantities of 300 lb. or more when specified for at one time.

Wrought Pipe.—Makers state the recent advance in prices is holding firmly. The new demand is active. On lap-weld sizes of iron and steel pipe the mills are practically sold up for all of this year, possibly having a small quantity for delivery late in the third quarter and over the fourth quarter. On line pipe none can promise deliveries before September or later. Most mills can make shipment on butt-weld sizes in four to six weeks from date of order. It is stated that one leading interest has 40,000 tons or more of tubular goods piled up in its warehouses on account of shortage of cars and motive power. The discounts on black and galvanized iron and steel pipe are given on another page.

Boiler Tubes.—Discounts on iron and steel tubes are largely nominal, as the mills are sold up practically over all of this year and can readily secure heavy premiums over regular prices for either locomotive or merchant iron or steel tubes for fairly prompt delivery. Two leading interests report they are sold out on steel tubes into 1918, and two large makers of seamless steel tubing say they are sold up to July 1 next year. The nominal discounts, but on which higher prices can be secured for fairly prompt delivery on iron and steel tubes, are given on another page.

Coke.—Producers report that the car supply on Saturday and Monday last was somewhat better, but it is still far short of being large enough to move coke promptly. Many thousands of tons are piled up in the yards awaiting cars, and these stocks have now become so large that some coke plants are either closing down for a few days or else are cutting down active ovens. Many blast furnaces in the Mahoning and Shenango valleys and some in the Pittsburgh district are banked

for lack of coke. It is believed, however, that if the present mild weather lasts for a week or more, the movement of coke will be much better. In the past week high-grade blast furnace coke for prompt shipment has sold at \$11 to \$11.50 and foundry coke at \$12 per net ton at oven. We quote best grades of blast-furnace coke at \$11 to \$11.50 per net ton at oven for spot shipment, and while \$7 to \$8 is talked of on contracts, nothing is doing. Best grades of 72-hr. foundry coke are bringing as high as \$12 per net ton at oven for spot shipment. The output of coke in the upper and lower Connellsville regions for the week ended Feb. 10 was only 302,933 net tons, a decrease over the previous week of 2095 tons. The above output is the smallest in the upper and lower Connellsville regions for some months.

Old Material.—The local scrap market still drags. For some time the largest movement has been in low-phosphorus melting stock, which is still in good demand, and also for borings and turnings. Sales of probably 5000 tons of low phosphorus melting stock were made in the past week at \$32 to \$32.50 per gross ton, delivered at buyer's mill, and a sale of 750 tons of billet and bloom low-phosphorus scrap is noted at \$33. There have also been small sales of turnings at about \$12, and of borings at \$12.25, delivered. Sales of heavy steel melting scrap between dealers have been made as low as \$21 per gross-ton. Prices for delivery in Pittsburgh and other consuming points that take Pittsburgh freight rates, per gross ton, are nominally as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	\$21.00 to \$22.00
No. 1 foundry cast	19.00 to 19.50
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md. and Franklin, Pa.	27.00 to 28.00
Hydraulic compressed sheet scrap	18.00 to 18.50
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	15.50 to 16.00
Bundled sheet stamping scrap	15.00 to 15.50
No. 1 railroad malleable stock	19.00 to 19.50
Railroad grates bars	12.50 to 13.00
Low phosphorus melting stock	32.00 to 32.75
Iron car axles	41.00 to 42.00
Steel car axles	45.00 to 46.00
Locomotive axles, steel	47.00 to 48.00
No. 1 busheling scrap	17.00 to 18.00
Machine-shop turnings	12.00 to 12.25
Old carwheels	20.50 to 21.00
Cast-iron borings	12.25 to 12.50
*Sheet bar crop ends	25.00 to 26.00
No. 1 railroad wrought scrap	23.00 to 24.00
Heavy steel axle turnings	15.50 to 16.00
Heavy breakable cast scrap	17.50 to 18.00

*Shipping point.

Philadelphia

PHILADELPHIA, PA., Feb. 20, 1917.

The jam of freight which is halting deliveries of all kinds practically everywhere, and the consequent shortage and high prices of coke are all-engrossing topics. The demand for ship plates is probably more overwhelming than ever. All makers are now quoting 5c., Pittsburgh, for tank plates. Inquiries for thousands of tons of ship steel do not find quotations. The inquiries for plates carry with them requests for large tonnages of ship shapes, the quotation for which is 4c., Pittsburgh. Pig iron has been more active, the buying covering the remainder of the year, and prices are stronger, but the chief concern is getting coke whereabouts to make iron, and getting the product to consumers. More Virginia furnaces have withdrawn from the market, and the few that are selling have advanced their prices. Ferromanganese is hard to find for delivery this side of July, and both foreign and domestic are quoted at higher levels. Billets are higher, and more difficult to obtain. A large inquiry for heavy melting steel is before the brokers, but they are reluctant to enter commitments at \$21, delivered, offered by buyers.

Pig Iron.—The market has been more active, with a good demand for spot iron, although, on the whole, sales call for deliveries well distributed over the remainder of the year. Shipments are woefully behind, and from all sides furnace representatives are receiving letters and telegrams telling them that iron on contracts must be hurried along or dire results will follow. The shippers, of course, are helpless. "Cannot get anything in

or out" is a common remark with regard to the freight situation, this being the experience from Virginia to New England. New business is sought to only a slight extent, for the reason that producers are engrossed with their delivery and coke troubles. Most of the week's business has been in Virginia iron, but the withdrawal from the market of additional furnaces precludes further business of moment in this direction. The leading Virginia maker is not selling, nor are two smaller companies, while two others have only a little to sell. For Virginia No. 2 X, \$30, furnace, or \$32.75, Philadelphia, is about the lowest quotation to be found for nearby delivery, one maker asking \$30.50, furnace, for delivery this side of July. One furnace withdrew for the reason that it has sold so heavily to others that it must now conserve its supply for its regular customers, many of whom are not covered for the last half. For No. 2 X eastern Pennsylvania iron, \$32, furnace, is about the minimum, the price delivered here being about \$32.80. From \$32, furnace, quotations range all the way up to \$35 for Buffalo iron, the latter price being equivalent to \$37.58, Philadelphia. One brand is held at \$33, furnace, equal to \$34.90, Philadelphia. For Southern No. 2, running low in phosphorus, \$26, Birmingham, has been paid. A few carloads of eastern Pennsylvania basic were placed at \$30, furnace. A steel and ordnance company took 5000 to 10,000 tons of standard low phosphorus at a price reported to be \$56.72, delivered, and business has been done at \$60, delivered. The makers are practically out of the market, and the range of quotations can only be called nominal at \$58 to \$60, delivered. The makers are confronted by an acute shortage of coke, added to troubles imposed by deep snows and extremely cold weather at their furnaces. Quotations for standard brands delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa. No. 2 X foundry	\$32.00 to \$33.00
Eastern Pa. No. 2 plain	31.50 to 32.50
Virginia No. 2 X foundry	32.25 to 32.75
Virginia No. 2 plain	31.75 to 32.25
Gray forge	29.75 to 30.75
Basic	30.50
Standard low phosphorus	58.00 to 60.00

Iron Ore.—Imports at this port in the week ended Feb. 17 consisted of 5884 tons from Spain, and 4676 tons from Sweden.

Ferroalloys.—But little 80 per cent ferromanganese is available this side of July. The English makers have advanced their quotation to \$185, seaboard, but require their representatives to obtain confirmation before closing any deals. A sale of 500 tons of foreign is reported. Domestic makers quote \$275 to \$300, delivered, for third quarter, and \$250 to \$275 for last quarter. A small quantity of spot has been offered at \$300, but so far without success. Last week 556 tons arrived at this port from England, and in this connection it is noted that consignees do not learn of shipments until they reach some American port. Spiegeleisen is in good demand, especially from those short of ferromanganese. The quotation ranges from \$70 to \$75, furnace, for 20 per cent, sales having been made at \$72.50, furnace. Fifty per cent ferrosilicon is practically unobtainable, and it is reported that small lots have sold at \$250, Pittsburgh. A purchase of 11 per cent ferrosilicon was made at \$49, furnace, or \$52.44, Philadelphia. In addition to purchasing the Vesta furnace at Marietta, Pa., the Lebanon Blast Furnace Company (E. J. Lavino & Co.) has also bought a furnace at Wrightsville, Pa. Both will be used in the manufacture of ferromanganese.

Plates.—Makers are a unit in asking 5.159c., Philadelphia, for tank plates. The demand, especially for ship plates, can only be described as an avalanche, many of the orders combining both ship plates and shapes. J. P. Morgan & Co., for France, are placing 12,000 tons of plates and shapes. For a Pacific coast freight ship 2000 tons has been placed, also material for a 6000-ton ship to be built in a Pacific yard, both for last half. The company which will supply the material for these ships also contracted to supply 1000 tons for export. An inquiry from Japan calls for no less than 40,000 tons of ship material, and there are other inquiries for 5000 and 6500 tons. A large eastern Pennsylvania mill, because of the overcrowded state of

its order books, has declined to quote on 20,000 to 25,000 tons of boat and boiler steel under French inquiry and 15,000 to 16,000 tons of similar steel wanted by Japanese shipyards. Italy wants 1200 to 1500 tons. Notwithstanding its refusal to quote on large tonnages, the mill referred to has booked nearly double its output in the past few weeks. Altogether, Pacific coast shipyards are asking prices on 30,000 tons of boat and boiler steel for 1918 shipment. The output of the mills has been about 90 per cent of capacity, an improvement over the preceding week. The freight situation causes numerous annoying delays in deliveries. The domestic shipyards continue to receive inquiries for boats, but have taken no orders for the reason that satisfactory deliveries cannot be promised. Large consumers, as a result of the general opinion that prices will go higher, are anxious to place contracts, but the mills do not want to go beyond July 1. Ship-plates are held at 6.159c., Philadelphia. Like sheared tank plates, universal plates are quoted at 5.159c., Philadelphia.

Structural Material.—A leading mill has no structural shapes to offer for delivery this year, but so far as it can is taking care of ship shapes when combined with plate orders, its quotation being 4c., Pittsburgh, or 4.159c., Philadelphia. The Charles McCaul Company was low bidder on about 200 tons required for the Pathological Hospital, this city. Contractors are bidding on a building for the Midvale Steel Company, Nicetown, Philadelphia, requiring about 150 tons. The Worth Steel Company, Claymount, Del., for which about 2000 tons of steel has been placed, is taking bids on 1300 tons additional required for the rolling mills. A Southern railroad is in the market for plates, shapes and bars for the construction of 1000 cars, probably 5000 tons of material being required. Quotations are unchanged at 3.659c., Philadelphia, minimum, with 3.909c. obtained for prompt shipment.

Billets.—Open-hearth rerolling billets are quoted at \$70 to \$72, mill, and even at these prices they are not readily found. Forging billets are held at \$80 to \$85.

Bars.—Inquiries have been received from the agricultural implement makers for second-half deliveries of steel bars, and the requirements of some of them already have been covered by the leading maker. The minimum quotation is unchanged at 3.25c., Pittsburgh, or 3.409c., Philadelphia, miscellaneous lots bringing up to 3.659c., Philadelphia. Iron bars, carload lots, are unchanged at 3.159c., Philadelphia.

Sheets.—The demand is lively and the market tight. For No. 10 blue annealed, 4.909c. to 5.159c., Philadelphia, is quoted.

Old Material.—Except in heavy melting steel, the market has shown no definite trend, and quotations are generally unchanged. Heavy melting steel is higher, \$21 having been offered and paid by a mill which wants a large tonnage. The dealers are chary about taking on heavy commitments, even at the price offered, evidently fearing that they may be caught short on a higher market. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates from 35c. to \$1.35 per gross ton, are as follows:

No. 1 heavy melting steel	\$20.50 to \$21.00
Old steel rails, rerolling	30.00 to 31.00
Low phosph. heavy melting steel scrap	30.00 to 32.00
Old iron and steel axles (for export)	43.00 to 45.00
Old iron rails	28.00 to 29.00
Old carwheels	20.50 to 21.00
No. 1 railroad wrought	25.00 to 26.00
Wrought-iron pipe	17.00 to 18.00
No. 1 forge fire	14.50 to 15.00
Bundled sheets	14.50 to 15.00
No. 2 busheling	13.00 to 14.00
Machine-shop turnings	12.00 to 12.50
Cast borings	13.00 to 13.50
No. 1 cast	20.00 to 21.00
Grate bars, railroad	15.50 to 16.00
Stove plate	16.00 to 16.50
Railroad malleable	17.50 to 18.00

Coke.—The spot coke situation daily grows worse, and the continuance of operations with some furnaces is exceedingly uncertain. Where the railroads have the cars, they lack the power to haul cars. Spot furnace was quoted yesterday at \$12 to \$12.50 per net ton at oven. Contract furnace is nominally around \$8. Spot foundry is quoted at \$12 to \$13 per ton at oven, with contract at \$7 to \$7.50. Even at the prices named de-

liveries cannot be guaranteed. Freight rates from the principal producing districts are as follows: Connellsville, \$2.05; Latrobe, \$1.85, and Mountain, \$1.65.

Chicago

CHICAGO, ILL., Feb. 20, 1917.

Increased interest in pig iron for last half delivery and higher prices for both Northern and Southern iron enlivened a week otherwise much restricted in its activities. Northern iron has gone to a basis of \$33 at the furnace and the Southern market is now at \$25, Birmingham. The embargoes on shipments eastward and the difficulty of securing cars for shipments in any direction are augmenting daily the trials of shippers and consumers of all classes of raw materials. The failure of transportation has put a premium on all materials in transit and a spot market is developing for steel as well as pig iron. An interesting feature of the market as affecting quotations on many forms of manufactured steel products is a marked discrepancy in the prices of the raw material entering into the product. This seems to have its basis in the fact that some manufacturers in quoting use prices of contracts made some months ago, the delayed deliveries under which are just now making the steel available for use, while other manufacturers, from choice or necessity, are quoting on the basis of the current market. The tentative advances being made by the Government to many producers of iron and steel in the matter of taking over plants for use in the event of emergency war needs has made these manufacturers somewhat conservative in their selling policies for the last half. In respect of volume, new business is lighter in those lines that are known to be sold up far ahead and is heavy in all directions where materials can be secured. The situation in the scrap market is one created almost entirely by the conditions of railroad congestion.

Rails and Track Supplies.—Recent inquiries for tie-plates previously mentioned are reported as still open. Rail purchases of the last week were small and few in number. Quotations are as follows: Standard railroad spikes, 3.50c. to 3.60c., base; track bolts with square nuts, 4.50c. to 4.60c., base, all in carloads, Chicago; tie-plates, \$55 to \$60, f.o.b. mill, net ton; standard section Bessemer rails, Chicago, \$38, base; open-hearth, \$40; light rails, 25 to 45 lb., \$44; 16 to 20 lb., \$45; 12 lb., \$46; 8 lb., \$47; angle bars, 2.25c.

Pig Iron.—The securing of contract shipments of pig iron from some of the most important sources of supply has become so difficult as to make the situation with many foundries precarious. Shortages of both pig iron and coke are now, in many instances, an impending menace. As a result, every available car of iron in transit is in demand and offerings by the furnaces of iron for prompt shipment are absorbed as rapidly as they are made. Two lots of 1000 tons of Southern basic have been sold for early delivery at prices as high as \$26, Birmingham, and of standard foundry iron, smaller lots for prompt shipment have brought \$27 and higher. The entire Southern market has advanced to a minimum of \$25 at Birmingham for last half and among sales, which in the last week or 10 days have aggregated approximately 15,000 tons, are contracts for 4500, 4000, 2000 tons and many smaller quantities. In the North, renewed activity on the part of malleable foundries has resulted in the placing of about 7500 tons at the generally uniform price of \$32, Chicago furnace. Following these sales an advance of \$1 per ton has been made. Shipments of Bessemer iron for export, which were temporarily halted by embargoes against Atlantic coast shipments, have been resumed, in part, via New Orleans and Gulf ports. The price of charcoal iron has been mounting rapidly and sales at as high as \$40 at the furnace have been made. A lot of 1000 tons brought \$38 at the furnace. The minimum quotation is \$34, with the largest sellers holding for \$35 and \$36. Ohio silvery irons are being quoted on the basis of \$42 at the furnace, and low phosphorus iron has sold in this territory at an approximate delivered price of \$59. For Lake Superior charcoal iron we

quote delivery prices at Chicago to include a freight rate of \$1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic irons, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5	\$35.75 to \$37.75
Lake Superior charcoal, No. 1	36.75 to 38.75
Lake Superior charcoal, No. 6 and Scotch	36.75 to 39.75
Northern coke foundry, No. 1	33.50
Northern coke foundry, No. 2	33.00
Northern coke foundry, No. 3	32.50
Northern high phosphorus foundry	30.00
Southern coke No. 1 f'dry and 1 soft.	29.50 to 30.50
Southern coke No. 2 f'dry and 2 soft.	29.00 to 30.00
Malleable Bessemer	33.00
Basic	33.00
Low phosphorus	58.00 to 59.00
Silvery, 8 per cent	43.50 to 44.50
Bessemer ferrosilicon, 10 per cent	50.00

Structural Material.—Among the contracts for steel placed with bridge shops last week were 450 tons for an ore-handling bridge for the Iroquois Iron Company, to be built by the Federal Bridge Company, 600 tons of plate girder spans for the Terminal Railroad Association at Venice, Ill., taken by the American Bridge Company, and 125 tons of bridge steel for the same association, taken by the Stupp Bros. Bridge & Iron Company. Aside from the inquiry of the Pere Marquette for 1000 freight cars and the contract taken by the Chicago Steel Car Company for 500 tons of car frames, there is little activity in railroad car work. We quote for Chicago delivery of structural steel from mill, 3.439c. to 3.689c.

We quote for Chicago delivery of structural steel out of jobbers' stocks 4c.

Plates.—From a few sources plates can still be had for deliveries in six to eight weeks at prices ranging from 5c. to 6c. at the mill, depending upon the widths and specifications desired. The number of mills still able to quote can be counted almost on one hand and even they are limiting quantities to each buyer to comparatively small amounts. The jobbers also, with a very few exceptions, are confined in their service to a restricted range of sizes and quantities. We quote for Chicago delivery of plates from mill, at its convenience, 3.939c.; for prompt shipment, in widths up to 72 in., 4.689c. to 5.189c., and for wide plates, 4.939c. to 6.25c., depending upon deliveries.

We quote for Chicago delivery of plates out of jobbers' stocks 4.75c.

Sheets.—Variations in the prices of blue annealed sheets, in some instances of such degree as to be explained only in connection with old contracts, are appearing in the prices of pressed steel and fabricated products. The market as applied to new business placed now with the mills is exceedingly firm and better than 4.50c. for No. 10 can hardly be done. For box annealed sheets prices as high as 5.50c. are being successfully quoted by the mills, though some material continues to be available at 5c. The inquiry for galvanized sheets is light. We quote, for Chicago delivery, No. 10 blue annealed, 4.50c. to 4.75c.; box annealed, No. 16 and lighter, 5c. to 5.25c.; No. 28 galvanized, 6.50c. to 6.75c. These quotations are minimum prices for contracts. Early shipment quotations are \$5 to \$10 per ton higher.

We quote for Chicago delivery out of stock, regardless of quantity, as follows: No. 10 blue annealed, 5.25c.; No. 28 black, 5.40c.; No. 28 galvanized, 7.50c.

Cast-Iron Pipe.—The purchase of 350 tons of pipe for Rockford, Ill., is to be authorized to-day and at Detroit, Minn., 425 tons will be bought. The high prices of pipe have discouraged the ordering of much necessary material despite the fact that even higher quotations appear to be in sight. We quote as follows, per net ton, Chicago: Water pipe, 4-in., \$44.50; 6-in. and larger, \$41.50, with \$1 extra for class A water pipe and gas pipe.

Bars.—The first half of February has shown a marked increase, for some mills, of both specifications and new contracts for iron and rerolled steel bars. With the largest producers of steel bars out of the market and such business as can be placed for delivery within 60 days commanding 3.25c. to 3.50c., Pittsburgh, for Bessemer bars, the bar-iron and rail-carbon bar mills are having no difficulty in securing more orders than

they desire at 3c., f.o.b. mill. We quote mill shipment, Chicago, as follows: Bar iron, 3c. to 3.25c.; soft steel bars, 3.189c. to 3.439c.; hard steel bars, 3c. to 3.25c.; shafting, in carloads, 20 per cent off; less than carloads, 15 per cent off.

We now quote store prices for Chicago delivery as follows: Soft steel bars, 3.75c.; bar iron, 3.75c.; reinforcing bars, 3.75c., base, with 5c. extra for twisting in sizes $\frac{1}{2}$ in. and over and usual card extras for smaller sizes; shafting list plus 5 per cent.

Rivets and Bolts.—Rivet makers in this market are quoting generally on the basis of 4.25c., Pittsburgh, though in most instances this quotation is nominal, the mills having nothing to sell. The fact that nearly all users are meeting their current needs under contracts eliminates very largely the question of price uniformity. There is very little bolt inquiry but specifications continue heavy. We quote as follows: Carriage bolts up to $\frac{3}{8} \times 6$ in., rolled thread, 40-10; cut thread, 40-2 $\frac{1}{2}$; larger sizes, 30-5; machine bolts up to $\frac{3}{8} \times 4$ in., rolled thread, with hot pressed square nuts, 50; cut thread, 40-10; large size, 35-5; gimlet-point coach screws, 50; hot pressed nuts, square, \$2.50 off per 100 lb.; hexagon, \$2.60 off. Structural rivets, $\frac{3}{8}$ to $1\frac{1}{4}$ in., 4.40c. to 4.45c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

Store prices are as follows: Structural rivets, 4.50c.; boiler rivets, 4.60c.; machine bolts up to $\frac{3}{8} \times 4$ in., 40-10; larger sizes, 35-5; carriage bolts up to $\frac{3}{8} \times 6$ in., 40-2 $\frac{1}{2}$; larger sizes, 30-5; hot pressed nuts, square, \$3, and hexagon, \$3 off per 100 lb.; lag screws, 50.

Old Material.—While something of a paradox, it is nevertheless true that the greater part of the buying of scrap in this market is traceable to the railroad congestion. The tendency of the market toward slightly higher prices is attributable to the same cause. The larger buyers of scrap probably have on order abnormally large quantities of old material, more in some instances than they would like to have on their yards. But because what has been bought cannot be delivered, these buyers continue in the market, paying premiums frequently for material which can be had promptly. Relief for the railroads seems certain to bring with it a big increase in stocks on consumers' yards, a quiet market and corresponding price adjustments. With most consumers the price of scrap has now been worked up to a high level and the natural endeavor will be to operate with the smallest possible stocks. Railroad offerings of scrap last week were negligible. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

	Per Gross Ton
Old iron rails	\$27.00 to \$28.00
Relaying rails	34.00 to 35.00
Old carwheels	18.00 to 18.50
Old steel rails, rerolling	27.00 to 28.00
Old steel rails, less than 3 ft.	24.50 to 25.00
Heavy melting steel scrap	22.00 to 22.50
Frogs, switches and guards, cut apart	22.00 to 22.50
Shoveling steel	18.75 to 19.25
Steel axle turnings	14.00 to 14.50

	Per Net Ton
Iron angles and splice bars	\$27.00 to \$27.50
Iron arch bars and transoms	27.75 to 28.25
Steel angle bars	21.50 to 22.00
Iron car axles	34.00 to 35.00
Steel car axles	34.00 to 35.00
No. 1 railroad wrought	24.00 to 25.00
No. 2 railroad wrought	23.00 to 24.00
Cut forge	23.00 to 24.00
Pipes and flues	14.00 to 14.50
No. 1 busheling	16.50 to 17.00
No. 2 busheling	12.50 to 13.00
Steel knuckles and couplers	22.50 to 23.00
Steel springs	23.50 to 24.00
No. 1 boilers, cut to sheets and rings	13.50 to 14.00
Boiler punchings	18.50 to 19.00
Locomotive tires, smooth	31.00 to 31.50
Machine-shop turnings	9.25 to 9.75
Cast borings	9.25 to 9.75
No. 1 cast scrap	16.00 to 16.50
Stove plate and light cast scrap	12.00 to 12.50
Grate bars	12.50 to 13.00
Brake shoes	12.50 to 13.00
Railroad malleable	17.25 to 17.75
Agricultural malleable	14.75 to 15.25

Wire Products.—Prices continue as last quoted. While deliveries of wire in all forms are much delayed, jobbers and retailers have in a measure adjusted themselves to the conditions and by virtue of their short-time contracts are providing accordingly against their most pressing requirements. We quote to jobbers as follows, per 100 lb.: Plain wire, Nos. 6 to 9, base,

\$1.239; wire nails, \$3.189; painted barb wire, \$3.339; galvanized barb wire, \$4.039; polished staples, \$3.339; galvanized staples, \$4.039, all Chicago.

Cleveland

CLEVELAND, OHIO, Feb. 21, 1917.

Iron Ore.—An Eastern furnace company that recently booked a round tonnage of Bessemer pig iron for export has bought about 75,000 tons of Lake ore and will make additional purchases. Another inquiry is pending for 25,000 tons. We quote prices as follows, delivered lower Lake ports: Old range Bessemer, \$5.95; Mesaba Bessemer, \$5.70; old range non-Bessemer, \$5.20; Mesaba non-Bessemer, \$5.05.

Pig Iron.—There is a considerable demand for both foundry and malleable iron in small lots for prompt shipment, coming largely from consumers that are not getting deliveries as desired on contracts and from some that have substituted Southern iron for Northern but desire to use some of the latter in their mixture. A further advance in foundry iron to \$35 for No. 2 has been made in the Cleveland price for prompt shipment, and contract, and small lot prompt shipment sales are being made by Valley furnaces at \$36 to \$38. In Toledo \$33 is the minimum last-half price for foundry and malleable iron. The demand for Southern foundry is quite active and prices are firmer. Sales were made a few days ago at \$23, Birmingham, for No. 2, but quotations now range from \$24 to \$25 for the last half and sales are being made at the latter price. We note the sale of a 1500-ton lot in northern Ohio, 2000 tons to a Pittsburgh sanitary interest, and several 300 to 500 ton lots. The Cincinnati embargo is being avoided by routing Southern iron to Cleveland via Chicago. Virginia foundry iron has been advanced to \$30 in this market. The demand for low-phosphorus iron is quite active and we note one sale of 500 tons at \$56.50. We quote, delivered Cleveland, as follows:

Bessemer	.....	\$35.95
Basic	.....	30.95
Northern No. 2 foundry	.....	\$34.00 to 35.30
Southern No. 2 foundry	.....	28.00 to 29.00
Gray forge	.....	31.95
Ohio silvery, 8 per cent silicon	.....	39.62 to 41.62
Standard low-phos., Valley furnace	.....	56.00

Coke.—Producers who recently announced a price of \$6.50 per net ton at oven for standard Connellsville foundry coke for the last half and for a full year have advanced to \$7. Consumers are so far showing no interest in the matter of contracts. There is a considerable demand for prompt shipment foundry coke, which is quoted at \$12 to \$14 per net ton at oven.

Finished Iron and Steel.—Some inquiry has developed for contracts for the third and fourth quarter, particularly for bars, and business is being placed for these deliveries. There is also a fair volume of new inquiry for steel for specific work, including requirements for locomotives. Specifications are fairly heavy. The railroad situation is apparently worse as regards shipments of steel, and in a number of plants some departments are shut down for lack of material. Some of the Ohio sheet mills have covered with Bessemer sheet-bar contracts for the second quarter at \$65, Youngstown, and up to \$70 is being asked. A Canton manufacturer is inquiring for 1100 tons of Bessemer billets. The demand for plates continues heavy and the market is very firm. One mill is quoting tank plates at 4.50c., Pittsburgh, but most mills, including local makers, are asking 5c. and higher. We note the sale of 1400 tons of boiler flange plates for tank car tanks. In structural material the McClintic-Marshall Company has taken the Metropolitan Building, Akron, requiring 655 tons, and an inquiry is out for 3500 tons for Pennsylvania Railroad grade crossing elimination in Chicago. The demand for bar iron has improved, and the market is firm at 3c., Pittsburgh. There is a heavy demand from manufacturers for sheets. We quote sheets at 4.75c. to 5.50c., Ohio mill, for No. 28 black; 4.50c. to 5c. for No. 10 blue annealed, and 6.50c. to 7c. for No. 28 galvanized. Cleveland jobbers have advanced plate prices to 5c. Other warehouse prices

are 4c. for steel bars, 4.10c. for structural material, 5c. for hoops, and 5c. for blue annealed sheets.

Bolts, Nuts and Rivets.—Specifications on bolt and nut contracts are fairly heavy, but new inquiry is only moderate, although some of the automobile manufacturers are in the market. Deliveries have improved, particularly on heavy bolts. Rivet prices are unchanged at 4.25c., Pittsburgh, for structural and 4.35c. for boiler rivets. Bolt and nut discounts are as follows:

Common carriage bolts, $\frac{3}{8}$ x 6 in., smaller or shorter, rolled thread, 40 and 10; cut thread, 40 and $2\frac{1}{2}$; larger or longer, 30 and 5. Machine bolts with h.p. nuts, $\frac{3}{8}$ x 4 in., smaller or shorter, rolled thread, 50; cut thread, 40 and 10; larger or longer, 35 and 5. Lag bolts, cone point, 50. Square and hexagon, h.p. nuts, blank, \$2.50 off the list; tapped, \$2.30 off. C.p.c. and t. hexagon nuts, all sizes, blank, \$2.25 off; tapped, \$2 off. Cold pressed semi-finished hexagon nuts, 50, 10 and 5 off.

Old Material.—The market is dull, but prices are firm. About the only trading is in small lots between dealers who are covering on contracts. Dealers report that heavy melting steel scrap is bringing better prices here than in Pittsburgh, which is quite unusual. Dealers are offering as high as \$23.50 for delivery to one mill. Consumers are still well supplied and are out of the market, although one is offering considerably lower than the present market for heavy steel scrap. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton	
Steel rails	\$21.00 to \$21.50
Steel rails, rerolling	26.00 to 27.00
Steel rails under 3 ft.	26.00 to 26.50
Iron rails	28.00 to 28.50
Steel car axles	47.00 to 48.00
Heavy melting steel	22.00 to 22.50
Carwheels	19.50 to 20.00
Relaying rails, 50 lb. and over	37.00 to 38.00
Agricultural malleable	15.00 to 15.50
Railroad malleable	20.50 to 21.00
Steel axle turnings	16.50 to 17.00
Light bundled sheet scrap	14.50 to 15.00

Per Net Ton	
Iron car axles	\$44.00 to \$45.00
Cast borings	9.00 to 9.35
Iron and steel turnings and drillings	9.00 to 9.25
No. 1 busheling	17.75 to 18.25
No. 1 railroad wrought	24.00 to 25.00
No. 1 cast	17.75 to 18.25
Railroad grate bars	13.00 to 13.25
Stove plate	12.50 to 12.75

Buffalo

BUFFALO, N. Y., Feb. 20, 1917.

Pig Iron.—A steady demand is experienced for small lots for emergency use; but it is exceedingly difficult to secure even small quantities from local producers, practically nothing being obtainable except Southern iron. No matter how importunate are the demands from consumers, it appears to have been impossible to get shipments out of furnace yards. Furnacemen say nothing like the clogged up freight conditions of the past week have ever existed in this section. The impossibility of getting in fresh supplies of coke and other raw materials, combined with shortage of labor, is checking furnace production and resulting in a very pronounced increase in cost of production. The milder weather of the latter part of the week, however, and the energetic efforts of railroad officials are beginning to afford relief from the jam in the local yards, and further improvement in the abnormal situation is expected. The furnace stack that was banked last week on account of three trainloads of coke being stalled for nearly a week in heavy snow and ice only 11 miles away is again in commission, delivery of the coke having been made. Prices remain about the same as a week ago, from \$35 to \$37 per ton, at furnace, without regard to difference between silicon and low grade irons. We quote as follows for first-quarter and first-half delivery, f.o.b. furnace, Buffalo:

High silicon irons	.....	\$35.00 to \$35.50
No. 1 foundry	.....	35.00 to 35.50
No. 2 X foundry	.....	35.00 to 35.50
No. 2 plain	.....	35.00 to 35.50
No. 3 foundry	.....	35.00 to 35.50
Gray forge	.....	35.00 to 35.50
Malleable	.....	35.00 to 35.50
Basic	.....	35.00 to 35.50
Bessemer	.....	35.00 to 35.50
Charcoal, according to brand and analysis	.....	37.50 to 40.00

Finished Iron and Steel.—Steel-mill operations are still more restricted than a week ago on account of in-

ability to either get in supplies or to ship out finished products. Yards are badly congested with manufactured materials which railroads are unable to move. Because of these conditions manufacturing costs are going up more rapidly than at any time since the outbreak of the war. Sales departments are being instructed by operating departments to make no further commitments until it can be determined how long present traffic conditions are going to continue. A Toronto distributor of sheets is negotiating for the movement of a solid trainload of product from mill, representing accumulations which have been held up for a number of weeks. Where found possible, the same thing is being done by combinations of distributors or users of finished materials, in cases where solid trains can be put through to one destination, to save delays in switching at junction points that are apt to occur in the case of forwarding single carload shipments.

Old Material.—Freight embargoes and transportation delays are still confining transactions in scrap iron and steel to minimum amounts. Sales reported have been mostly of special grades required for particular uses, and which are commanding somewhat better prices than ordinary classes of scrap. As a general proposition, no changes have been made in prices, the volume of trade not being sufficiently large to establish an accurate basis. We therefore continue to quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	\$24.00 to \$25.00
Low phosphorus	32.00 to 36.00
No. 1 railroad wrought	28.00 to 29.00
No. 1 railroad and machinery cast	22.50 to 23.50
Iron axles	45.00
Steel axles	45.00
Carwheels	23.00 to 23.50
Railroad malleable	22.00 to 23.00
Machine shop turnings	10.50 to 11.00
Heavy axle turnings	16.00 to 16.50
Clean cast borings	11.00 to 11.50
Iron rails	25.00 to 26.00
Locomotive grate bars	15.00 to 15.50
Stove plate	14.00 to 14.50
Wrought pipe	16.00 to 16.50
No. 1 busheling scrap	20.50 to 21.50
No. 2 busheling scrap	13.00 to 13.50
Bundled sheet scrap	14.00 to 14.50

Birmingham

BIRMINGHAM, ALA., Feb. 19, 1917.

Cast-Iron Pipe.—The pipe market, while experiencing a lull in big new municipality business, owing to high prices, is sustained by scattering fill-in orders and past due contracts lapping over from busier times, as well as by orders for flange pipe from the oil fields. Operations are still around capacity. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., \$39; 6-in. and upward, \$36, with \$1 added for gas pipe and special lengths.

Pig Iron.—Commencing around Feb. 9, the first real buying movement of the year began in this Birmingham district, and in a week's time between 75,000 and 100,000 tons had been booked by furnaces. One small interest booked 15,000 to 20,000 tons in lots ranging from carloads to 2000 tons. This seller claims the bookings were all on the \$24 basis for second-half delivery, the orders coming with a rush. After making these sales the furnace making them withdrew from the market. The largest foundry interest sold its make, or maybe more—about 40,000 tons—at prices, it is stated, of \$24 and \$24.50 for second-half delivery and then marked up to \$25 for the rest of the year. Another furnace company took 1000 tons of iron for Middle Western second-half delivery at \$23 from another interest which offered \$24 about the middle of last week, but immediately afterward marked up to \$25 for the first half and \$24 for the second. It is, however, understood that especially desirable customers might yet place second half orders under \$24. This interest sold later in the week at \$24 for second half. The leading interest speaks of \$23.50 for second half and is not interested in the spot market. Two thousand tons of what might fall under the class of silvery iron went for Middle Western second-half delivery at \$25.50. Clifton high silicon iron on spot sale has brought \$26.50. Cincinnati and other Middle West-

ern points clamor for delivery. Cessation of foundry operations is threatened in more than one quarter, owing to failure to receive metal on time. Some Tennessee iron sold around Feb. 8 at \$23, but no more of that is believed to be available. The market has undoubtedly strengthened recently and some makers look for higher prices. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	\$24.00 to \$25.50
No. 2 foundry and soft	23.50 to 25.00
No. 2 foundry	23.00 to 24.50
No. 4 foundry	22.75 to 24.25
Gray forge	22.50 to 24.00
Basic	23.50 to 25.00
Charcoal	28.00 to 29.00

Coal and Coke.—Standard beehive foundry coke is higher. Spot is quoted at \$12 per net ton at oven, and sales are around that figure. A Southern consumer of long standing as a regular customer signed a contract for a 12-month supply of foundry coke at \$8.50. Furnace coke is selling at \$5 to \$6 per ton. Both coke and coal movements continue to be hampered by car shortage and congestion. Coal is retailing in Birmingham at \$5 per ton and steam coal is bringing from \$2.50 to \$3 per net ton f.o.b. mines.

Old Material.—The scrap market remains in the rather listless state which has characterized it for several weeks. Dealers have considerable stocks and are slow in taking on more until prices improve. That they will rise at an early date, owing to consumption, is the general belief on their part. Meanwhile, actual sales show no change. We quote, per gross ton, f.o.b. Birmingham dealers' yards, as follows:

Old steel axles	\$35.00 to \$36.00
Old steel rails	17.00 to 18.00
No. 1 wrought	17.00 to 18.00
No. 1 melting steel	14.00 to 14.50
No. 1 machinery	16.50 to 17.00
Carwheels	13.00 to 13.50
Tram carwheels	12.00 to 12.50
Stove plate and light	11.00 to 11.50

St. Louis

ST. LOUIS, Mo., Feb. 19, 1917.

Pig Iron.—Although no large transactions took place during the week and no large inquiries appeared on the surface, it is known that considerable effort was made and is still being made by consumers to obtain tonnages in considerable amounts through private negotiations. This is particularly true of a number of interests which have realized that they are not protected against the full year 1917 and are anxious to place contracts before the price goes any higher. Ferromanganese is badly wanted and almost any price up to \$300 per ton would be paid. Lake Superior charcoal iron is quoted at \$40 at furnace and some sales were made at that, though in small lots.

Coke.—The tension previously reported continues and prices are largely what the buyer and seller can agree upon at the moment, with reports of \$13 to \$13.25 per net ton at oven paid during the week for best 72-hr. selected Connellsburg. One large transaction for delivery over the entire year was for 15,000 tons of smelter coke, for Alton, Ill., delivery. The price is said to have been above a basis of \$6 per ton at oven. By-product coke of local consumption is still out of the market.

Finished Iron and Steel.—Specifications on contracts continue heavy and urgent, and there is developing a tendency among consumers to take up contracts for future deliveries. Mill representatives are inclined to hold such customers off on account of the peculiar conditions now existing. Movement out of warehouse continues heavy and quotations for products out of stock are being made as follows: Soft steel bars, 3.80c.; iron bars, 3.75c.; structural material, 4.05c.; tank plates, 4.80c.; No. 10 blue annealed sheets, 5.30c.; No. 28 black sheets, one pass, cold rolled, 5.75c.; No. 28 galvanized sheets, 8c.

Old Material.—Dealers are trading among themselves to cover shortages and also to make deliveries which have been interfered with by the embargoes on the railroads, but at that there is not a great amount of actual business being done. Consumers are known to be melting heavily and to be making inroads on their surplus stocks as a result of the effect of the embargo.

in current deliveries. For this reason dealers are looking for some active advances in the market as soon as material can be moved. At present the chief call seems to be for No. 1 railroad wrought, with some demand for foundry grades of steel. There is also demand for scrap rails because of the high carbon content. Quotations made are stiffly held. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton

Old iron rails	\$26.00 to \$26.50
Old steel rails, rerolling	26.00 to 26.50
Old steel rails, less than 3 ft.	27.00 to 27.50
Relaying rails, standard section, subject to inspection	33.00 to 34.00
Old carwheels	18.50 to 19.00
No. 1 railroad heavy melting steel scrap	22.00 to 22.50
Heavy shoveling steel	19.00 to 19.50
Ordinary shoveling steel	17.50 to 18.00
Frogs, switches and guards cut apart	22.00 to 22.50
Ordinary bundled sheet scrap	13.50 to 14.00

Per Net Ton

Iron angle bars	\$26.00 to \$26.50
Steel angle bars	21.00 to 21.50
Iron car axles	34.00 to 35.00
Steel car axles	34.00 to 35.00
Wrought arch bars and transoms	27.50 to 28.00
No. 1 railroad wrought	23.50 to 24.00
No. 2 railroad wrought	22.00 to 22.50
Railroad springs	22.50 to 23.00
Steel couplers and knuckles	23.50 to 24.00
Locomotive tires, 42 in. and over, smooth inside	31.00 to 32.00
No. 1 dealers' forge	17.50 to 18.00
Cast iron borings	8.50 to 9.00
No. 1 busheling	15.50 to 16.00
No. 1 boilers, cut to sheets and rings	13.00 to 13.50
No. 1 railroad cast scrap	14.00 to 14.50
Stove plate and light cast scrap	10.00 to 10.50
Railroad malleable	15.50 to 16.00
Agricultural malleable	13.50 to 14.00
Pipes and flues	14.00 to 14.50
Heavy railroad sheet and tank scrap	13.50 to 14.00
Railroad grate bars	11.50 to 12.00
Machine shop turnings	9.00 to 9.50
Heavy axle and tire turnings	12.50 to 13.00

New York

NEW YORK, Feb. 21, 1917.

Pig Iron.—Railroad freight embargoes have checked any disposition to place orders for prompt shipment iron even where melters are in urgent need. Consumers of foundry iron in the Eastern territory also are showing less disposition to purchase for future delivery, but sales of miscellaneous lots, aggregating probably 10,000 tons, have been made in the last few days for shipment over the second quarter and last half of 1917. Most of the sales were made by eastern Pennsylvania and Virginia furnaces. Shipments are to be made into Connecticut and into the Hudson Valley, as well as into the New York metropolitan district. One Eastern agent of Alabama iron reports considerable activity for shipment into the Central West; sales for delivery over the third and fourth quarters amounted to about 10,000 tons, but very little if any of the iron is being sold for Eastern shipment. Of Virginia iron 800 tons for Connecticut and a lot of 1000 tons were taken at \$30 furnace for No. 2 foundry. Eastern Pennsylvania furnaces are still holding at \$31.50 to \$32 at furnace for No. 2 X foundry. Local agents of Buffalo furnaces have little iron to offer and No. 2 foundry is still nominally held at \$35 at furnace. Agents of the Entente Allies are endeavoring to purchase small lots of standard Bessemer iron for early shipment, but negotiations on large tonnage for future delivery, apparently, have been suspended. At the moment interest is centered more in the fuel situation than in pig iron. Founders are feverishly buying coke for shipment over the balance of this year. Sales of about 15,000 tons of beehive and by-product coke have been made for shipment during the second quarter and last half of this year at prices ranging from \$6.50 to \$7 per net ton at the ovens. Spot foundry coke is scarce and higher, sales having been made in the last day or two between \$14 and \$15 per ton. We quote at tidewater for early delivery: No. 1 foundry, \$32 to \$33; No. 2 X, \$32 to \$32.50; No. 2 plain, \$31 to \$31.50; Southern iron at tidewater, \$31 for No. 1 and \$29 to \$30 for No. 2 foundry and No. 2 soft.

Ferroalloys.—British makers of ferromanganese have advanced their price to \$185, seaboard, for any delivery, but have none to offer for the first half. This

is an advance of \$21 per ton over the former price, which was withdrawn last week. One representative, handling a large percentage of the imports, has orders to make no sales at present. The amount available from other British representatives for delivery in the last half is not large and it is reported that licenses to ship on present contracts for delivery in the first half have been in some cases reduced nearly 50 per cent. The market for domestic ferromanganese is also much stronger. An Eastern dealer, with conversion arrangements with several producers, is quoting \$250, delivered, for the last half and \$275, delivered, for the third quarter. Material for early or nearby delivery is commanding anywhere from \$250 to \$300, delivered, depending on conditions. Sales in the past week have not been large but several small lots of domestic alloy have gone at \$250, delivered, and some British alloy was sold at \$180, seaboard, for delivery in the last half. About 2500 tons of Cuban manganese ore has recently been sold as well as about 5000 tons of Indian ore and several sales of Brazilian ore are being negotiated. Some of these transactions have been put through at as high as 80c. per unit, which is believed to be a record price. Spiegeleisen is strong and active at \$70 to \$75, furnace. Ferrosilicon, 50 per cent, continues very scarce, with the demand more insistent. Nearby material is difficult to obtain and sales have been made at as high as \$250 per ton, delivered. As late as June was named as the date of delivery. The last contract price of \$99 to \$100, delivered, is being disregarded almost altogether.

Structural Material.—Activity continues; the largest orders come from manufacturing interests for plant extensions, and from railroads, but several large commercial buildings have been placed under contract and others are pending. The New York, New Haven & Hartford is understood to have placed 7000 tons, covering its 1917 bridge requirements with the American Bridge Company. The Philadelphia & Reading has distributed orders for 15 small bridges, calling for 800 tons, and has put out other bridge inquiries totaling 800 tons. This road is also preparing plans for freight terminals which will require about 3000 tons. The same company recently ordered 7000 tons of bridge work from the Bethlehem Steel Company for this year's delivery. The Boston & Maine is asking prices on 1700 tons for a bridge to span Deerfield River, near Greenfield, Vt. The Pennsylvania Lines West have distributed orders for bridges over street crossings in Chicago calling for 3765 tons, of which 970 tons will be furnished by the American Bridge Company. The Atlantic Coast Line has definitely decided to construct the James River bridge of reinforced concrete instead of steel. The Union Railroad terminal at Richmond, Va., 1300 tons, has been awarded to John Eichleay, Jr., Pittsburgh. The Chicago Steel Car Company has awarded a contract for 150 car frames, requiring 480 tons of steel, to a Western shop. Among other contracts placed are 1400 tons for a power house at Black Rock for the Buffalo General Electric Company, to be fabricated by the Lackawanna Bridge Company; 250 tons for cooling beds at the Sparrows Point plant of the Bethlehem Steel Company, awarded to the Jones & Laughlin Steel Company; 1300 tons for rolling mills and casting building at Claymont for the Worth Steel Company, as well as 500 tons additional for the same plant to be furnished by the Lackawanna Bridge Company. The Toledo Bridge & Crane Company has taken 1123 tons for an office building at Detroit for the Book Estate. Post & McCord will erect 3000 tons for the addition to the Travellers' Insurance Company's building at Hartford. There is a rumor that the general contract for the Commonwealth Hotel, New York, has been placed with the George A. Fuller Company, and that the steel contract, amounting to 10,000 tons, has gone to Post & McCord, but the report lacks confirmation. Among contracts pending may be noted: the Woolworth store on Fifth Avenue, requiring 300 tons of steel; a postoffice at Bayonne, N. J., 200 tons; alterations to the City Hall at Albany, 400 tons; Washington Square studio building, 1200 tons; institutional building on Randall's Island, 1000 tons; Prince George Hotel, Madison Avenue and Twenty-eighth Street, 800 tons; custom house at Birmingham, Ala., 800 tons;

Sherman National Bank Building, Fifth Avenue and Thirty-second Street, 250 tons; addition to the Brooklyn Institute, Flatbush Avenue and Eastern Parkway, 550 tons; Hotel Woodward, 2000 tons; office building at 130 to 134 William Street, 750 tons; St. Joseph Seminary at Yonkers, 300 tons, and bridges over the barge canal, 700 tons. Plans are also being prepared for a 16-story office building on West Forty-third and Forty-fourth streets, requiring 6000 tons of steel. A design is also being prepared for an office building to occupy the site of the American National Bank Note Building, Trinity Place. We quote mill shipments of shapes in two to five months at 3.419c. to 3.919c., New York, and late this year and in early 1918, 3.419c., New York. Warehouse shipments are now at 4.10c., New York.

Plates and Bars.—Railroad equipment manufacturers have placed additional contracts for 25,000 to 30,000 tons of bars and plates with Pittsburgh mills for shipment over the latter part of 1917 and first part of 1918 and over 100,000 tons are still under negotiation for the construction of cars and locomotives. The severe railroad embargo and the lack of vessels to move accumulated freight for export are held responsible for the offering of billets and bars for resale. One lot of 16,000 tons of billets is seeking a market to-day. A Staten Island shipbuilder has come into the market for 15,000 to 20,000 tons of ship plates and for 2000 to 3000 tons of tank plates specifications to be furnished during the second and third quarters of 1917. A new British inquiry is for 40,000 to 45,000 tons of ship plates and 10,000 to 12,000 tons of marine shapes, but it is understood that shipments are to be made to Japan. The Lake Torpedo Boat Company is actively in the market for steel to lay down keels for torpedo boats designed for the United States Government. It is difficult to purchase any sheared plates under 5c. per lb., Pittsburgh basis, for shipment in the next six months; and for earlier delivery, prices as high as 8½c. per lb. have been asked. Universal plates, while quoted as low as 3.75c. at the mill for delivery at convenience of the manufacturers, are difficult to buy even at 4½c. for this year's delivery. Temporarily business for shipment in the next two or three months is being held in abeyance because of the deplorable transportation outlook. We quote best deliveries on universal plates at 4.669c. to 5.169c., New York, ordinary tank plates at 5.169c., and ship plates at 6.169c., but first-half 1918 plates at 3.919c., New York. Out of store we quote 5c. and higher. We quote mill shipments of steel bars at 3.169c. to 3.669c., New York, the lower price for indefinite delivery and the higher for small quantities in, say, three months. We quote mill shipments of bar iron at 3.169c., New York. Out of warehouse iron bars are 3.70c., and steel bars are now 4c., New York.

Wire Products.—The Russian Government, through American agents, several days ago opened active negotiations with American mills on 100,000 tons of barbed wire for shipment before July. It is understood that some of this business has already been placed with the United States Steel Products Company and independent mills in the Pittsburgh district. The Italian Government is also actively negotiating for 20,000 tons of barbed wire for shipment in the next four months.

Cast-Iron Pipe.—Among the few public lettings announced the most important are those of Syracuse, N. Y., Feb. 26, on 500 tons of 4 to 24 in. and the city of New York, also Feb. 26, on 295 tons of 8 in. for the borough of Brooklyn and 88 tons of 6 and 8 in. for the borough of Richmond. The big Rochester job will shortly be ready for proposals, as specifications are now being prepared. This will take about 10,000 tons of either cast-iron pipe or riveted steel pipe. The number of inquiries from private buyers is encouraging, indicating that more interest is being taken as spring approaches. Export inquiries are becoming so numerous that American manufacturers are confident of a much greater trade for foreign account if shipping room should become more readily available at something like reasonable rates. Prices are firm. Carload lots of 6-in., class B and heavier, continue to be quoted

at \$41.50 per net ton, tidewater, with class A and gas pipe taking an extra of \$1 per ton.

Old Material.—The situation as to heavy melting steel scrap is becoming interesting. Good sales have been made by local brokers for delivery in eastern Pennsylvania at prices which show an advance of about \$2 per ton on the New York equivalent. The demand for export is such that any surplus over requirements of seaboard steel plants can be diverted for foreign shipment at a somewhat higher price. This condition appears to compel a reconstruction of our local quotations. The situation is also somewhat better with regard to rolling-mill stock, while relaying rails and rerolling rails are higher in response to a continued export demand. On the other hand, car axles for export are slightly lower. Brokers quote buying prices about as follows to local dealers and producers, per gross ton, New York:

Heavy melting steel scrap.....	\$19.50 to \$20.00
Relaying rails.....	38.00 to 40.00
Rerolling rails.....	29.00 to 30.00
Iron and steel car axles (for export).....	38.00 to 40.00
No. 1 railroad wrought.....	22.00 to 23.00
Wrought-iron track scrap.....	22.00 to 23.00
No. 1 yard wrought, long.....	20.00 to 20.50
Light iron (nominal).....	5.50 to 6.00
Cast borings (clean).....	12.00 to 12.50
Machine shop turnings.....	11.00 to 11.50
Mixed borings and turnings (nominal).....	11.00 to 11.50
Wrought-iron pipe (not galvanized or enameled).....	16.00 to 16.50

Cast scrap is strong because of difficulty in securing deliveries of pig iron under contract. The prices given below are such as are paid by consumers purchasing in good quantities, although foundries in New York City and Brooklyn are able to secure small lots from nearby dealers at \$1.50 to \$2 less per gross ton:

No. 1 cast.....	\$21.00 to \$21.50
No. 2 cast.....	18.50 to 19.00
Stove plate.....	14.00 to 14.50
Locomotive grate bars.....	13.75 to 14.00
Old carwheels.....	20.00 to 20.50
Malleable cast (railroad).....	19.00 to 19.50

Cincinnati

CINCINNATI, OHIO, Feb. 20, 1917.

Coke.—The railroad situation is so unsatisfactory that no stable quotations may be made for either prompt furnace or foundry coke. Some Wise County foundry coke brought \$15 per net ton at oven, the few cars involved being already en route. About \$10 is generally obtained for foundry coke where there is a chance of moving it within the next few weeks. Contract business for the entire year can be booked around \$8 per net ton at oven for 72-hr. coke, but furnace coke is only quoted for the last half, except in instances where a supply is in sight for shipment before July 1. Very little furnace coke business of any kind has been booked lately.

Pig Iron.—Foundry-iron consumers have recently made several contracts for both Southern and Virginia iron for last-half shipment and there has been a sprinkling of small orders for first-half delivery. A local firm booked 2000 tons of Southern foundry for July-December shipment. Other smaller sales for the same delivery were made as low as \$23, Birmingham basis, for No. 2 foundry. To-day's quotations are from \$24.50 to \$26, Birmingham, for prompt shipment and from \$24 to \$25 for strictly last-half movement. Southern iron has been bought freely by both Indiana and Michigan melters, who did not have a full year's supply. Michigan and Indiana firms have contracted for different lots of Virginia iron, the largest lot reported being taken by a Michigan manufacturer, who ordered 1000 tons at \$29 at Virginia furnace, for future shipment. Virginia No. 2 X is quoted to-day at \$29 to \$30 at furnace, by local firms, but one large producer has withdrawn from the market. The nominal price on No. 2 foundry, Ironton, is \$31 and on basic and malleable \$33. It is reported that no furnaces in that district will take any first-half business, except for small, odd lots of off iron, and that they are all averse to accepting orders for the last half. A sale of 1500 tons of Northern malleable was made to a central Ohio manufacturer for

last half shipment, but at a lower figure than is quoted to-day. In summing up the situation a prominent pig-iron merchant practically voiced the opinion of all of his colleagues in stating that lower prices in the immediate future seemed only a vague possibility. Ohio silvery irons are firm, with no sales reported. Based on freight rates of \$2.90 from Birmingham and \$1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

southern coke, No. 1 f'dry and 1 soft.	\$27.90 to \$28.40
southern coke, No. 2 f'dry and 2 soft.	27.40 to 27.90
southern coke, No. 3 foundry.	26.90 to 27.40
southern coke, No. 4 foundry.	26.40 to 26.90
southern gray forge.	25.90 to 26.40
Ohio silvery, 8 per cent silicon.	39.26 to 41.26
Southern Ohio coke, No. 1.	32.76
Southern Ohio coke, No. 2.	32.26
Southern Ohio coke, No. 3.	31.76
Southern Ohio malleable Bessemer.	34.26
Basic, Northern.	34.26
Lake Superior charcoal.	30.20 to 31.20
Standard Southern carwheel.	28.90 to 29.40

Finished Material.—Warehouse quotations have only been advanced on blue annealed sheets that are now quoted from local stocks around 5.15c. to 5.25c., based on No. 10 gage. Plates and small structural shapes are in better demand, and as a consequence store quotations are firmer. We quote local store prices as follows: Small structural shapes, 4.10c. to 4.20c.; steel bars, 3.85c.; rounds, 2-in. and over, 4.45c., base; plates, 4.70c. to 4.80c.; wire nails, \$3.40 to \$3.50 per keg, base; round head rivets, 4.50c. to 4.60c. The nearby mills appear to be firm in maintaining their quotations of 7.15c., Newport or Cincinnati, on No. 28 galvanized sheets and 5.15c. on No. 28 black sheets. In spite of the high prices there seems to be an improving demand for all kinds of sheets, with the automobile manufacturers leading in their specifications.

Old Material.—It is stated that the railroads are making arrangements for melting a larger proportion of their scrap than heretofore, although present selling prices of scrap are far ahead of those three years ago. Whether this is feasible from an economical standpoint is a question yet to be determined. The demand for scrap from the foundries is a little more urgent. The following are dealers' prices f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton	
Bundled sheet scrap.	\$14.00 to \$14.50
Old iron rails.	24.25 to 24.75
Relaying rails, 50 lb. and up.	27.75 to 28.25
Rerolling steel rails.	24.25 to 24.75
Heavy melting steel scrap.	20.25 to 20.75
Steel rails for melting.	20.25 to 20.75

Per Net Ton	
No. 1 railroad wrought.	\$21.00 to \$21.50
Cast borings.	6.50 to 7.00
Steel turnings.	6.50 to 7.00
Railroad cast.	15.75 to 16.75
No. 1 machinery cast.	17.50 to 18.00
Burnt scrap.	9.75 to 10.25
Iron axles.	32.50 to 33.00
Locomotive tires (smooth inside).	27.00 to 27.50
Pipes and flues.	13.25 to 13.75
Malleable cast.	14.75 to 15.25
Railroad tank and sheet.	11.75 to 12.25

The Panama Canal announces that proposals will be received at the office of the assistant purchasing agent at 24 State Street, New York, not later than 2 p. m., March 1, for the purchase of a large stock of pipe fittings now on the Isthmus of Panama. Most of these fittings have not been used, although in stock for some time, while the remainder are second-hand, and all are stated to be serviceable. The specifications of these fittings cover 1014 items of varying quantities and of a wide range of sizes.

Bids were received for 100 tons of pig iron by the purchasing officer of the Panama Canal, Washington, Feb. 13, under circular 1116, class 1, as follows: The Debevoise-Anderson Company, New York, \$3,232, 30 days; R. W. Geldart, New York, \$3,560, 60 days; S. W. Marshall & Co., Philadelphia, \$3,500, 40 days; the Matlack Coal & Iron Corporation, New York, \$3,562.50, 60 days; the United States Steel Products Company, New York, \$2,877.67, 45 days.

The Titanium Alloy Mfg. Company, whose general offices and works are at Niagara Falls, N. Y., has moved its New York office from 15 Wall Street to the City Investing Building, 165 Broadway.

British Steel Market

Ferromanganese and Ferrosilicon Higher but Nominal—American Steel Dull

(By Cable)

LONDON, ENGLAND, Feb. 21, 1917.

Pig iron is firm and shipments are improving. Increased business is being done in hematite iron. American semi-finished steel is slack and terms are prohibitive. Tin plates are steadier at 27s. Ferromanganese is nominal at about £37 and firmer, while ferrosilicon is quoted at about £35 upward, but is also nominal. We quote as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 27s. as compared with 26s. 6d. a week ago.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £19 5s. Hematite pig iron, f.o.b. Tees, 142s. 6d.

Sheet bars (Welsh) delivered at works in Swansea Valley, £15 5s. nominal.

Ferromanganese, £37 nominal.

Ferrosilicon, 50 per cent, c.i.f., £35 upward against £29 10s. last week.

(By Mail)

Market Almost Monopolized by National Requirements—Export Practically Stopped

LONDON, Feb. 10, 1917.

Attention continues to be monopolized by national requirements, the extent of which is greater than ever. Productive capacity is being developed further in all directions, however, and manufacturers generally seem to be in a better position to grapple with the vast amount of work awaiting execution. Making allowance for growing labor difficulties and that transport is handicapped by lack of cars, etc., the progress of operations is considered satisfactory, and tends to be facilitated by the more adequate deliveries of pig iron.

In consequence of the additional blast furnaces restarted recently, the position of pig iron shows further evidence of ease. Urgent home needs at any rate seem to be well covered for the near future, and the outlook in this direction is free from anxieties, inasmuch as the output shows possibilities of further extension. The allotments of Cleveland iron are now indeed expected to be made on a much freer scale, there being a fairly ample supply available. Consumers are inclined to buy well ahead, though makers are not keen to make forward sales. Export business is only moderate, and can only be done as licenses permit. The production of steel is being increased in connection with the shipbuilding program, but consumers are able to renew their contracts pretty freely.

Steel export business is practically stopped, except where material is urgently wanted for our Allies. The home use of steel is everywhere being eliminated except for essential needs as emphasized by the drastic regulations in force. In view of the persistent demand, the tendency of finished material is as strong as ever.

Business in American semi-finished steel is virtually at a standstill, but 4-in. billets are still called \$90 to \$95, c.i.f. Liverpool, for future shipment. There is a hungry demand for Mediterranean ports, but freight difficulties prohibit business. American wire rods are scarce and quoted £28 10s., c.i.f., March-April.

The Welsh tin-plate industry is as handicapped as it can be by the stringent regulations in force, and export business has come practically to a stop. The mills are now securing about one-third of their normal supply of steel, the deliveries being roughly 9500 tons a week, which is equally divided among them. No trading is now allowed in black plates, tin plates and terne plates in the home trade except under a government certificate, and this also applies to stock plates, the authorities being resolved that no steel shall be used except for essential purposes. The attempts made lately by a deputation of makers and merchants to secure a modification have proved abortive.

In ferromanganese the tone is very firm, chiefly due to the constant hardening tendency of Indian manganese ores. Makers are practically sold up to midsummer.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c. Denver pipe, 76.1c., minimum carload, 46,000 lb.; structural steel and steel bars, 83.6c., minimum carload, 36,000 lb. Pacific coast (by rail only), pipe, 65c.; structural steel and steel bars, 75c., minimum carload, 50,000 lb.; structural steel and steel bars, 80c., minimum carload, 40,000 lb. No freight rates are being published via the Panama Canal, as the boats are being used in transatlantic trade.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, $\frac{1}{4}$ in. thick and over, and zees 3 in. and over, 3.25c. to 3.50c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs.	.10
Angles, 3 in. on one or both legs less than $\frac{1}{4}$ in. thick, as per steel bar card, Sept. 1, 1909.	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail).	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909.	.20 to .80
Deck beams and bulb angles.	.30
Handrail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive.	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive.	.50
Cutting to lengths, under 1 ft.	.155
No charge for cutting to lengths 3 ft. and over.	

Plates.—Tank plates, $\frac{1}{4}$ in. thick, 6 in. up to 100 in. wide, 3.75c. to 5c., base, net cash, 30 days, or $\frac{1}{2}$ of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras

	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers).	.10
Boiler and flange steel plates.	.15
"A. B. M. A." and ordinary firebox steel plates.	.20
Still bottom steel.	.30
Locomotive firebox steel	.50
Marine steel, special extras and prices on application.	

Gage Extras

Rectangular, $\frac{1}{4}$ in. thick, over 6 in. wide to 100 in. wide. Base	
Lighter than $\frac{1}{4}$ in., to $\frac{3}{16}$ in., up to 72 in. wide.	.10
*Lighter than $\frac{1}{4}$ in., including $\frac{3}{16}$ in., over 72 in. to 84	.20
*Lighter than $\frac{1}{4}$ in., including $\frac{3}{16}$ in., over 84 in. to 96	.30
*Lighter than $\frac{1}{4}$ in., including $\frac{3}{16}$ in., over 96 in. to 100	.40
*Lighter than $\frac{1}{4}$ in., including $\frac{3}{16}$ in., over 100 in. to 102	.45
Lighter than $\frac{3}{16}$ in., including No. 8, up to 72 in. wide	.15
*Lighter than $\frac{3}{16}$ in., including No. 8, over 72 in. to 84	.25
*Lighter than $\frac{3}{16}$ in., including No. 8, over 84 in. to 96	.35
Lighter than No. 8, including No. 10, up to 60 in. wide.	.30
Lighter than No. 8, including No. 10, over 60 in. to 64.	.35
Up to 72 in. and not less than 10.2 lb. per sq. ft. will be considered $\frac{1}{4}$ in.	
Over 72 in. must be ordered $\frac{1}{4}$ in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.	
Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of $\frac{3}{16}$ in., take price of $\frac{3}{16}$ in.	.30
Over 72 in., ordered weight $\frac{3}{16}$ in., take No. 8 price.	
Over 72 in., ordered weight No. 8, take No. 10 price.	

Width Extras

Over 100 in. to 110 in. inclusive.	.05
Over 110 in. to 115 in. inclusive.	.10
Over 115 in. to 120 in. inclusive.	.15
Over 120 in. to 125 in. inclusive.	.25
Over 125 in. to 130 in. inclusive.	.50
Over 130 in.	1.00

Length Extras

Universal plates 80 ft. long up to 90 ft. long.	.05
Universal plates 90 ft. long up to 100 ft. long.	.10
Universal plates 100 ft. long up to 110 ft. long.	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over.	
Lengths under 3 ft. to 2 ft. inclusive.	.25
Lengths under 2 ft. to 1 ft. inclusive.	.50
Lengths under 1 ft.	1.55
Circles 3 ft. in diameter to 100 in.	.30
Circles over 100 to 110 in. (width extra)	.35
Circles over 110 to 115 in. (width extra)	.40
Circles over 115 to 120 in. (width extra)	.45
Circles over 120 to 125 in. (width extra)	.55
Circles over 125 to 130 in. (width extra)	.80
Circles over 130 in. (width extra)	1.30
Circles under 3 ft. to 2 ft., inclusive.	.55
Circles under 2 ft. to 1 ft., inclusive.	.80
Circles under 1 ft.	1.85
Half circles take circle extras.	
Sketches not over four straight cuts, inc. straight taper	.10
Sketches having more than four straight cuts.	.20
Plates sheared to a radius take complete circle extras.	

*Including extra for width.

Wire Rods.—Including chain rods, \$80.

Wire Products.—Prices to jobbers effective Nov. 27: fence wire Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, \$2.95; galvanized, \$3.65. Galvanized barb wire and

staples, \$3.85; painted, \$3.15. Wire nails, \$3. Galvanized nails, 1 in. and longer, \$2 advance over base price; shorter than 1 in., \$2.50 advance over base price. Cement-coated nails, \$2.90. Woven wire fencing, 53 per cent off list for carloads, 52 off for 1000-rod lots, 51 off for less than 1000-rod lots.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from Feb. 14, 1917, all full weight:

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
$\frac{1}{8}$, $\frac{1}{4}$ and $\frac{3}{8}$...	55	28 $\frac{1}{2}$	$\frac{1}{8}$ and $\frac{1}{4}$...	41	17
$\frac{1}{2}$...	59	44 $\frac{1}{2}$	$\frac{1}{2}$...	45	18
$\frac{3}{4}$ to 3...	62	48 $\frac{1}{2}$	$\frac{3}{4}$ to 1 $\frac{1}{2}$...	49	31
			1 $\frac{1}{2}$ to 2...	52	38
			2 to 12...	46	33

Lap Weld			Reamed and Drifted		
1 to 3. butt	60	46 $\frac{1}{2}$	$\frac{3}{4}$ to 1 $\frac{1}{2}$, butt	47	30
2, lap	53	40 $\frac{1}{2}$	$\frac{1}{4}$, lap	33	17
2 $\frac{1}{2}$ to 6, lap	56	43 $\frac{1}{2}$	1 $\frac{1}{2}$, lap	39	24
7 to 12	51	37 $\frac{1}{2}$	2, lap	40	25
13 and 14	45 $\frac{1}{2}$	37 $\frac{1}{2}$	2 $\frac{1}{2}$ to 4	47	34
15	43	32 $\frac{1}{2}$	4 $\frac{1}{2}$ to 6	48	36
		7 to 12...	7 to 8...	42	30
			9 to 12...	37	25

To the large jobbing trade an additional 5 per cent is allowed over the above discounts, which are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized, but in some sections of the country discounts on less than carloads are three (3) points less (higher price) than the carload discount on both black and galvanized steel pipe.

On butt and lap weld sizes of black iron pipe, discounts for less than carload lots to jobbers are four (4) points lower (higher price) than carload lots, and on butt and lap weld galvanized iron pipe are five (5) points lower (higher price).

Boiler Tubes.—Discounts on less than carloads, freight to be added, effective from Nov. 1, 1916, except 3 to 4 $\frac{1}{2}$ in. steel from Nov. 20, are as follows:

Lap Welded Steel	Standard Charcoal Iron
1 $\frac{1}{2}$ in.	31
1 $\frac{1}{2}$ and 2 in.	43
2 $\frac{1}{2}$ in.	40
2 $\frac{1}{2}$ and 2 $\frac{1}{2}$ in.	46
3 and 3 $\frac{1}{4}$ in.	46
3 $\frac{1}{2}$ to 4 $\frac{1}{2}$ in.	46
5 and 6 in.	45
7 to 13 in.	42

Locomotive and steamship special charcoal grades bring higher prices.

1 $\frac{3}{4}$ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Sheets.—Makers' prices for mill shipments on sheets of United States standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Blue Annealed Sheets	Cents per lb.
Nos. 3 to 8...	.475 to 5.00
Nos. 9 to 12...	.450 to 4.75
Nos. 13 to 16...	.425 to 4.50
No. 17 and lighter gages are based on \$4.75 per 100 lb. for No. 28 Bessemer black sheets.	

Box Annealed Sheets, Cold Rolled	Cents per lb.
Nos. 17 to 21...	.455 to 4.80
Nos. 22 and 24...	.460 to 4.85
Nos. 25 and 26...	.465 to 4.90
No. 27...	.470 to 4.95
No. 28...	.475 to 5.00
No. 29...	.480 to 5.05
No. 30...	.490 to 5.15

Galvanized Sheets of Black Sheet Gage	Cents per lb.
Nos. 10 and 11...	.550 to 5.75
Nos. 12 to 14...	.560 to 5.85
Nos. 15 and 16...	.585 to 6.00
Nos. 17 to 21...	.590 to 6.15
Nos. 22 and 24...	.605 to 6.30
Nos. 25 and 26...	.620 to 6.45
No. 27...	.625 to 6.50
No. 28...	.650 to 6.75
No. 29...	.665 to 6.90
No. 30...	.680 to 7.05

Tin Mill Black Plate	Cents per lb.
Nos. 15 and 16...	.430 to 4.55
Nos. 17 to 21...	.435 to 4.60
Nos. 22 to 24...	.440 to 4.65
Nos. 25 to 27...	.445 to 4.70
No. 28...	.450 to 4.75
No. 29...	.455 to 4.80
No. 30...	.455 to 4.80
Nos. 30 $\frac{1}{2}$ and 31...	.460 to 4.85

Metal Markets

The Week's Prices

Feb.	Cents Per Pound for Early Delivery							
	Copper, New York	Tin, Electro-	Lead	Spelter	New	New	St.	St.
Lake	lytic	New York	New York	St. Louis	St. Louis	St. Louis	St. Louis	St. Louis
14	35.00	35.00	52.50	9.00	8.90	10.50	10.25	
15	35.50	35.50	50.50	9.25	9.15	10.50	10.25	
16	35.50	35.50	49.87 1/2	9.50	9.25	10.50	10.25	
17	35.75	35.75	...	9.50	9.25	10.50	10.25	
18	36.00	36.00	49.00	9.50	9.25	10.50	10.25	
19	36.00	36.00	48.75	9.50	9.25	10.75	10.50	

NEW YORK, Feb. 21, 1917.

In all the metals which come from the West the delays and uncertainties involved in shipments to the East have created an unusual situation in that high premiums are asked for spot metal, while interest in futures has been more or less killed. It is realized that an improvement in the freight situation will mean lower prices. Spot copper has been sold at 36.12 1/2c., but buyers are few. But little lead is on the Atlantic seaboard, and 10.25c. has been paid. Tin alone is easier, with buyers holding off. Spelter is quiet, but firm, with spot commanding premiums. Antimony continues scarce. Aluminum is dull but steady.

New York

Copper.—So little has been doing that it is difficult to get a tangible line on the market. On Monday 36.12 1/2c. was paid for prompt electrolytic, while yesterday a part of the same metal was offered at 37c. Consumers are showing but little interest, and when a buyer is in need he is apt to be squeezed. April is about 35.50c.; May, about 34.50c.; June, about 33.50c., and July about 32.50c., these being dealers' prices. Producers quote about 32c. for July, and 30.50c. to 31.50c. for the third quarter. There is little doing for the third quarter and nothing for the fourth, and only small inquiries for March to June are appearing. The producers are having troubles in getting materials to their refineries. The London quotation for spot, yesterday, was £150 against £147 a week ago. The exports this month, including yesterday, total 20,394 tons.

Tin.—The week has been flat and uninteresting. Consumers are in a comfortable position as to supplies, and apparently believe that prices will decline unless cargoes are lost through the activity of submarines. So far the arrivals have been ample, 3000 tons having arrived this month up to yesterday. Throughout the week there has been a growing pressure to sell, and quotations have declined, that of yesterday for spot Straits being 48.75c., against 53c. a week ago. On March 16, March and April arrivals were offered at 45.75c., with no takers. Meanwhile brokers are having their difficulties in shipping to their customers in the interior. The quantity afloat yesterday was 3048 tons.

Lead.—The freight situation has upset the lead market to an unheard-of degree, and quotations for spot metal, which is exceedingly difficult to obtain, have gone to levels not touched since the Civil War. For March shipment 9.25c. was asked a week ago, but buyers were wary because of the uncertainty of arrival. At the close of the week 10.25c. was paid for a carload of spot, and since then 11c. and over is reported to have been bid. On Saturday March lead sold at 9.75c. The exports this month, including yesterday, total only 365 tons. The London quotation yesterday, as compared with a week ago, was unchanged at £30 10s.

Spelter.—The market is quiet, but firm, a little added strength being shown yesterday. Despite the scarcity of spot metal, for which premiums are asked, the attitude of consumers is one of indifference. What inquiry has developed has been for prompt or early delivery. Unconfirmed reports are to the effect that 12c. has been paid for spot metal. The uncertainty of deliveries from the West is repressing business in the future positions. For prompt, 10.50c., St. Louis, was quoted yesterday,

with March at 10.25c. to 10.37 1/2c. and second quarter at 9.75c. to 10c., but it was admitted that these prices were subject to shading. The exports, Feb. 1 to 21, totaled 6948 tons. The London quotation yesterday was unchanged at £47, as compared with a week ago.

Antimony.—For spot Chinese and Japanese grades, 30c. to 32c., duty paid, is quoted, but there are few sellers even at these prices. No interest is manifested in futures, principally for the reason that several shipments are somewhere en route from the Pacific coast, some of which have been two or three months on the road. Their arrival will ease the market.

Aluminum.—In a dull market, the quotation for No. 1 virgin aluminum is unchanged at 57c. to 59c. per lb.

Old Metals.—A still higher level of values has been reached. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	32.50 to 33.50
Copper, heavy and wire	31.50 to 32.00
Copper, light and bottoms	26.00 to 26.50
Brass, heavy	19.50 to 20.00
Brass, light	15.00 to 15.50
Heavy machine composition	26.00 to 26.50
No. 1 yellow rod brass turnings	19.25 to 19.75
No. 1 red brass or composition turnings	21.00 to 23.00
Lead, heavy	8.00
Lead, tea	7.50
Zinc	8.75

Chicago

FEB. 20.—The limitations placed upon the available supply of most of the metals, both by previous heavy sales and the congestion of delivery facilities, continue to force prices upward. The exceptional advance in tin, partly artificial, has been moderated. We quote: Casting copper, 34c.; Lake Copper, 36c.; tin, carloads, 49c., and small lots, 51c.; lead, 9.75c. to 10c.; spelter, 10.50c. to 10.75c.; sheet zinc, 21c.; Cookson's antimony, 50c.; other grades, 34c. to 35c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 27.50c.; copper bottoms, 25.50c.; copper clips, 26.50c.; red brass, 25c.; yellow brass, 19c.; lead pipe, 8c.; zinc, 7.50c.; pewter, No. 1, 30c.; tinfoil, 34c.; block tin pipe, 39c.

St. Louis

FEB. 19.—Metals continue firm, with quotations today, in less than carload lots, as follows: Lead, 10c.; spelter, 11.50c.; tin, 54c.; Lake copper, 38c.; electrolytic copper, 37.50c.; antimony, Asiatic, 35c. In carload lots the quotations are: Lead, 9.25c.; spelter, 10.25c. to 10.50c. In the Joplin district the prices for zinc blende ranged from \$80 to \$100 per ton, with the average for the week for the district at \$85. On calamine the range was \$45 to \$55, with the average for the week at \$49. Lead ore was the center of interest, with an advance of \$14.50 to \$122.50 per ton, or \$18.50 higher than the best previous record. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 12.50c.; heavy yellow brass, 13.50c.; heavy red brass and light copper, 19.50c.; heavy copper and copper wire, 23c.; zinc, 7c.; lead, 5.50c.; tea lead, 3.50c.; pewter, 25c.; tinfoil, 35c.

British Prohibit Dealings in Lead

Dealings in lead were prohibited by the British Government except under license and for the execution of contracts commencing Feb. 2. Within 10 days all persons were ordered to report their lead holdings, deliveries and contracts and until further notice lead may not be used except for repairs and in quantities under 1 cwt. (112 lb.) except under license.

On recommendation of C. P. Rutherford, smoke inspector for Louisville, Ky., the city building inspector has issued a ruling to the effect that hereafter no permits will be issued for installation inside the city of return tubular high-pressure boilers with a setting of less than 36 in. from the grate to the bottom of the boiler. This action was taken as a means of reducing the smoke evil, it being claimed that the higher setting increases the efficiency of soft coal combustion and checks the production of smoke.

PERSONAL

A. F. Huston, president Lukens Steel Company, Coatesville, Pa., is in Florida for a stay of several weeks.

Joseph C. Regan, formerly superintendent of production of the Yale & Towne Mfg. Company, Stamford, Conn., has been made factory manager of the Trumbull Electric Mfg. Company, Plainville, Conn. Stanley S. Gwillim, for the past six years superintendent of the Trumbull plant, has been appointed office manager, succeeding Carl W. Jones.

Philip J. Stremmel has been made general manager of the Niedringhaus plants at Granite City, Ill., operated as a part of the National Enameling & Stamping Company. He has been connected with the company 17 years, having grown to manhood in its service and continuing with it since reaching his majority.

John O. Pew, who retired Feb. 15 as president of the Youngstown Iron & Steel Company, was given a dinner in the Hotel Ohio, Youngstown, last week, attended by about 90 employees. Mason Evans, treasurer, acted as toastmaster and presented Mr. Pew with a diamond stickpin as a gift from the employees.

The Apollo Steel Company, Apollo, Pa., manufacturer of black and galvanized sheets, has elected Robert Lock president and operating manager; A. M. Oppenheimer, treasurer and business manager, and C. L. Pollock, formerly chief clerk, secretary and general manager of sales.

Edward M. Hagar, formerly president Universal Portland Cement Company, has withdrawn from the Wright-Martin Aircraft Corporation, New York, of which he was president. He expects to take a rest before assuming duties in another field, plans concerning which are to be announced in the near future.

Farnham Yardley, formerly vice-president of Jenkins Brothers, manufacturers of valves, packing, etc., 80 White Street, New York, was recently elected president of the company to fill the vacancy caused by the death of Alfred B. Jenkins. Frank T. Swain, general manager, was elected vice-president. Samuel Laird, manager of the Philadelphia business, has been elected a director to fill the vacancy in the board. With these exceptions, the officers and directors were re-elected.

John Hoffman has been appointed master mechanic of the Pittsburgh Crucible Steel Company, Midland, Pa., vice C. A. Harper, resigned.

D. H. Ramsbottom, assistant manager of sales of the National Tube Company, has been re-elected secretary and treasurer of the Union Club, Pittsburgh.

F. H. Wilcox, metallurgical engineer with the United States Bureau of Mines, has resigned and is now associated with the Huessener Engineering Company, Oliver Building, Pittsburgh.

Asa L. Moore, Lebanon, Pa., has been appointed assistant superintendent of the Carnegie Steel Company's blast furnaces at New Castle, Pa.

J. B. Weaver, formerly connected with the Newport News Shipbuilding & Drydock Company, has become vice-president and general manager of the Harlan & Hollingsworth Corporation, Wilmington, Del., succeeding Persifor Frazer, resigned.

The Guerber Engineering Company, iron and steel construction, South Bethlehem, Pa., at its recent annual meeting elected R. Park Hutchinson, president; F. C. Stout, vice-president; W. B. Myers, treasurer, and Franklin H. Brunner, secretary.

B. E. Hutchinson, formerly assistant to the president of the Grand Crossing Tack Company, and more recently assisting in the adjustment of matters involved in the acquisition of that company by the Interstate Iron & Steel Company, Chicago, has resigned. He is engaged for the present in a consulting capacity in the examination of a project to build a by-product

coke-oven, blast-furnace and steel works for the manufacture of wire products and sheets at Clinton, Iowa.

Dean W. F. H. Goss, of the College of Engineering, University of Illinois, and recently acting at the head of the commission investigating the smoke problem of Chicago, has resigned to accept the presidency of the Railway Car Manufacturers' Association, New York. Dr. Goss was dean of the engineering school of Purdue University for 10 years prior to his association with the University of Illinois in 1907. He has had special prominence in the development of locomotive engineering laboratories at both institutions and is nationally known as an authority in the subject of railroad motive power.

Henry Evans, president Continental Insurance Company, New York City, has been elected a director of the Sloss-Sheffield Steel & Iron Company. The board has been increased from 11 to 12 members.

J. E. Baum, president Supplee-Biddle Hardware Company, Philadelphia, since its organization, announced last week that he had sold out his entire interest to Heulings Lippincott, president National State Bank, Camden; Marshall Morgan, Philadelphia, and the Biddle interests. Mr. Baum recently was elected president of the Empire Tire & Rubber Company, Trenton, and will devote his time to that and other personal business.

Robert S. Alter, secretary and export manager of the American Tool Works Company, Cincinnati, Ohio, has been elected president of the Foreign Trade Association of the Cincinnati Chamber of Commerce.

John C. Jay, Jr., formerly vice-president of the Pennsylvania Steel Company, and chairman of the board of the Maxwell Motor Company, has joined the firm of Jamieson, Houston & Graham, consulting engineers, 40 Wall Street, New York. The firm will hereafter be known as Jamieson, Houston, Graham & Jay.

Harry S. Hunter, for some years Pittsburgh manager of the Chicago Pneumatic Tool Company, has resigned, effective March 1, and will become active president of the Hunter Saw & Machine Company, Pittsburgh.

Major Joseph T. Speer, chairman of the board of directors of the Pittsburgh Valve, Foundry & Construction Company, Pittsburgh, gave his annual dinner to officials and employees of the company at the Hotel Anderson, on Tuesday evening, Feb. 20.

At a meeting of stockholders of the American Vanadium Company, held in the Vanadium Building, Pittsburgh, on Tuesday, Feb. 20, officers were elected as follows: James J. Flannery, former president, chairman of the board; J. Leonard Reogle, president; D. E. Fernandini, first vice-president; James C. Gray, second vice-president; A. J. Neeb, treasurer, and C. B. Aylesworth, secretary.

Swedish Iron and Steel Output

Official returns of the Swedish iron and steel industry give the pig-iron output in 1915 at 760,701 metric tons, of which 35,075 tons was made in electric furnaces. Of the total 419,686 tons was open-hearth iron, 161,835 tons forge iron, 121,476 tons Bessemer iron, and 45,931 tons foundry iron. Furnaces in blast were 120 with an average output of 21.4 tons per day. Charcoal was almost exclusively the fuel, 674,360 tons having been used.

The output of wrought iron blooms was 119,629 tons; Bessemer steel ingots, 91,070 tons; open-hearth steel, 503,766 tons; crucible steel, 3395 tons; electric steel, 2187 tons, and blister steel, 148 tons. The forged iron and steel production was 42,403 tons and the rolled iron and steel 830,167 tons.

Ore output included 7607 tons of manganese ore, 55,937 tons of zinc ores, 1642 tons of nickel ores and 76,324 tons of pyrites.

An 18 per cent dividend has been declared by the Biehl Iron Works, Reading, Pa.

New Wellman-Seaver-Morgan Directorate

New interests are largely represented in the Wellman-Seaver-Morgan Company, Cleveland, as is indicated by the annual election of directors on Feb. 20, when seven new directors were elected and only four of the old board were retained. The new directors are Franklin B. Richards, T. E. Borton and E. H. Whitlock, Cleveland; F. A. Seiberling, president Goodyear Tire & Rubber Company; Francis Seiberling and J. W. Chamberlain, Akron, and F. E. Myers, Ashland. The old directors re-elected are S. T. Wellman, W. P. Cowell, F. E. Hewitt and S. H. Pitkin. It is understood that the changes in the directorate will result, at the organization of the board in a few days, in the election of a successor to Willard N. Sawyer, who has been president and general manager for several years, but who has been unable to give much attention to the business for the past two years because of poor health.

Navy to Get American Shells

Contracts for navy projectiles which had been awarded to Hadfields, Ltd., Sheffield, England, were given Feb. 19 to the Midvale Steel Company, the Washington Steel & Ordnance Company and the Crucible Steel Company of America. Hadfields was prevented by the British Government from accepting the contract. Representatives of the companies and Navy Department officials reached an agreement on a flat price of \$500 a shell. That is an increase over the price on similar orders in previous years, but the aggregate is \$447,500 less than the former total bid. Contracts are for 14,200 14-in. armor piercing shells. The companies guaranteed delivery in reduced time.

Steel Plant Projected in Iowa

A project is being actively fostered by H. W. Seaman, president American Wire Fabrics Company, looking to the establishment of a steel plant at Clinton, Iowa, which will include by-product coke ovens, a blast furnace, an open-hearth steel plant and finishing mills for the manufacture of wire products and sheets. The project contemplates the advantageous assembly of raw materials by river barge, including ore from Minnesota, via the Mississippi River, and coal from Pennsylvania and Kentucky, via the Ohio River, and particularly the advantage of producing in the immediate proximity of a large market for the products made.

Bethlehem Increases Capital Stock

By filing an amended charter with the Secretary of State at Trenton, N. J., Feb. 17, the Bethlehem Steel Company increased its authorized capital stock from \$30,000,000 to \$75,000,000, in compliance with the plan ratified at a stockholders' meeting, despite injunction proceedings instituted by the General Investment Company, of which Clarence H. Venner is president. The application for an injunction was dismissed by Vice-Chancellor Lane.

The Master Sheet Metal Contractors' Association, Columbus, Ohio, has elected the following officers: President, Harvey Blackwood; vice-president, A. E. Munkel; secretary, W. J. Kaiser; treasurer, Fred Myrick. The directors chosen are William Blackiston, George E. Snyder and W. E. Lammek. In an address at the meeting A. E. Munkel stated that after careful investigation he had ascertained that overhead expenses for the average sheet metal shop would average 66 2/3 per cent of productive labor.

In December, 1916, 53,846 tons of iron and steel manufactured goods were shipped through the Panama Canal. This total was exported entirely from the port of New York, going to Siberia, Chile, New Zealand, Java and Japan, as against 1 ton of these goods shipped from Japan to New York. At the same time 600 tons of iron were shipped to Chile, Java and Australia and 4006 tons of steel to New Zealand, Japan, Siberia and Australia.

OBITUARY

FREDERICK E. REED, founder of two of the units of the present Reed-Prentice Company, Worcester, Mass., died at his home in Thompson, Conn., Feb. 18, after a short illness from paralytic shock. Mr. Reed, who was nearly 70 years old, had been active in machine-tool building from 17. He was first employed as a book-keeper for the Wood & Light Machine Company, Worcester, in which his father, John Reed, had an interest. Later he became chief draftsman for the same company. In 1875 he bought the interest of Vernon Prentice in the firm of A. F. Prentice & Co., and in 1877 became sole owner of the business which, as the F. E. Reed Company, became one of the best known manufacturers of lathes. In after years he organized the Reed-Curtis Machine Screw Company and the Reed Foundry Company. He retired from active business in 1912, when all three of the enterprises in which he had been most prominent were absorbed into the Reed-Prentice Company. Mr. Reed was also heavily interested financially in other Worcester industries, notably the Mathews Mfg. Company and the Worcester Lawn Mower Company.

JAMES F. BLESS, Newark, N. J., president Positive Lock Washer Company and partner in Bless & Drake, manufacturers of sad irons, died at his home in that city Feb. 9 from heart trouble, aged 81 years. He was born in Kentucky and became a resident of Newark when 17 years of age. He engaged with his father in the manufacture of sad irons under the name of Bless & Son, which later became Bless & Drake, a partnership with Robert A. Drake. He was president of the National State Bank of Newark up to December, 1910, relinquishing the office at that time on account of its exacting duties, to become first vice-president; early in January he was re-elected for the seventh consecutive term to this office. Mr. Bless was a member of the South Side Presbyterian Church of Newark, an honorary member of the Forest Hill Golf Club and active member of the Essex Golf Club and Canoe Brook Country Club. He leaves three daughters.

Prof. GEORGE S. ATWOOD, who had been a resident of the American colony in Berlin, Germany, for many years and for the past 13 years was secretary of the American Association of Commerce and Trade, died suddenly Feb. 18. He was born in Boston. He leaves his widow and also a son, who is in the United States.

CHARLES ALEXANDER CANDA, secretary Chrome Steel Works, Chrome N. J., died Feb. 8 at his home in Elizabeth, N. J., aged 47 years. He was born in New York, but had made his home in Elizabeth for the last eight years. He was a member of the American Society of Mechanical Engineers.

GEORGE ROSS, inventor of the Ross valve and president of the Ross Valve Mfg. Company, died at his home in Troy, N. Y., Feb. 9, aged 88 years. He was the pioneer valve manufacturer.

BEAUMONT THOMAS, head of the firm of Richard Thomas & Co., Ltd., one of the largest makers in tin plate in Wales and located at Llanelli, Wales, is dead, as cabled to this office Feb. 20.

GEORGE W. BOLLMAN, Pittsburgh, for years a prominent foundryman, died Feb. 13, aged 77 years. He leaves his widow, one son and two daughters.

HARRY W. MACALROY, assistant general manager, National Machine Company, Tiffin, Ohio, died Feb. 6 from pneumonia, aged 48 years.

The Alan Wood, Iron & Steel Company, Conshohocken, Pa., Feb. 19, turned gas into one of the three new open-hearth furnaces it has had under construction, and in about two weeks will be adding to its production of steel. The capacity of each of these new furnaces is 80 to 85 tons. The other two furnaces will be completed within two months.

Iron and Industrial Stocks

NEW YORK, Feb. 21, 1917.

As time steadily passes with no overt act against the United States by Germany the tense situation is relaxing and prices of securities are gradually recovering from their depression. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week has been as follows:

Allis-Chal., com..	24 1/2 - 26 1/4	Gulf S. Steel.	
Allis-Chal., pref..	80 - 82 1/4	1st pref.....	104
Am. British Mfg., com..	7 - 8	Harb-Walk. Refrac.	
Am. Can com..	42 3/4 - 45 1/4	pref.....	104 - 104 1/2
Am. Can, pref.....	107 1/2	Int. Har. of N. J., com.....	112 1/4 - 117
Am. Car & Fdry., com..	62 - 65	Int. Har. of N. J., pref.....	118
Am. Car & Fdry., pref.....	116 - 116 1/4	Int. Har. Corp., com.....	79 1/2
Am. Loco., com..	69 - 73 1/4	Int. Har. Corp., pref.....	111
Am. Loco., pref..	103 - 103 1/4	La Belle Iron, com.....	75 1/4 - 82
Am. Rad., com..	420 - 440	Lacka Steel.....	75 1/4 - 81
Am. Rad., pref.....	124 1/2	Lake Sup. Corp., 16 1/2 - 22 1/4	
Am. Ship com..	60 - 62	Lima Loco.....	57 - 58 1/2
Am. Steel Fdries, 59 - 63		Lukens, 1st pref.....	98 - 99
Bald. Loco., com. 51 1/4 - 55 1/4		Midvale Steel.....	53 1/4 - 56 1/2
Bald. Loco., pref.....	102 1/4	Nat-Acme.....	34 - 36
Beth. Steel, com. 140* - 390		Nat. Enam. & Stm., com.....	30 1/2 - 34 1/2
Beth. Steel, class B.....	119 1/2 - 122	N. Y. Air Brake, 141 1/4 - 147	
Beth. Steel, pref.....	125	Nova Scotia Steel.....	161
Cambrria Steel.....	102	Pitts. Steel, pref.....	99 1/2
Can. Car & Fdy., com.....	29	Pressed Stl., com. 74 1/4 - 77 1/2	
Can. Car & Fdy., pref.....	69	Pressed Stl., pref. 105 1/4 - 105 1/2	
Central Fdry., pref.....	35	Ry. Steel Spring, com.....	46 - 49 1/2
Charcoal Iron, com.....	8	Republic, com. 73 1/2 - 79 1/2	
Chic. Pneu. Tool, 67 - 69		Republic, pref. 101 1/8 - 101 1/4	
Colo. Fuel.....	39 1/2 - 48 1/2	Sloss com.....	58 - 62 1/2
Cruc. Steel, com. 63 1/2 - 68		Superior Steel.....	28
Cruc. Steel, pref.....	114	Transue-Williams 42 - 43	
Deser. & Co., pref.....	96 1/4	Un. Alloy Steel.....	42 1/2 - 44
Driggs-Seabury.....	50 - 54 1/2	U. S. Pipe, com. 19 1/2 - 20 1/4	
Gen. Electric.....	163 1/2 - 165	U. S. Pipe, pref. 59 1/2 - 60	
Gt. No. Ore Cert. 31 - 33 1/2		U. S. Steel, com. 104 1/2 - 109 1/2	
Gulf States Steel, 111 - 116		U. S. Steel, pref. 117 1/2 - 118 1/2	
		Va. I. C. & Coke, 48 1/2 - 56	
		Warwick.....	9 1/2 - 9 1/4
		Westing. Elec. .. 50 - 51 1/4	

*Ex. dividend and ex. stock rights.

Dividends

The United States Cast Iron Pipe & Foundry Company, 5 per cent on the preferred stock, payable in quarterly installments of 1 1/4 per cent, the first payable March 15.

The Cambria Steel Company, regular quarterly, 1 1/2 per cent and extra 1 1/2 per cent, payable March 15.

The Republic Iron & Steel Company, regular quarterly, 1 1/4 per cent on the preferred stock, payable April 2, and 1 1/2 per cent on the common stock, payable May 1.

The Crucible Steel Company of America, regular quarterly, 1 1/4 per cent on the preferred stock and an extra 1 1/4 per cent to apply on accrued dividends.

The American Window Glass Machine Company, preferred, 3 1/2 per cent, payable March 1.

The Brier Hill Steel Company, regular quarterly, 1 1/2 per cent and extra 2 per cent on the common stock, and regular quarterly, 1 1/4 per cent on the preferred stock, all payable April 1.

The J. I. Case Threshing Machine Company, regular quarterly, 1 1/4 per cent on the preferred stock, payable April 1.

Fairbanks, Morse & Co., regular quarterly, 1 1/2 per cent on the preferred stock, payable March 1.

The Gulf States Steel Company, regular quarterly, 2 per cent on the common stock, 1 1/2 per cent on the second preferred stock and 1 1/4 per cent on the first preferred stock, all payable April 2.

The Youngstown Sheet & Tube Company, regular quarterly, 2 per cent and extra 3 per cent on the common stock and regular quarterly, 1 1/4 per cent on the preferred stock, payable April 1.

The Dominion Steel Foundries, Ltd., 5 per cent on the common stock and regular quarterly, 1 1/4 per cent on the preferred stock, both payable March 1.

The Maxwell Motor Company, regular quarterly, 2 1/2 per cent on the common stock, 1 1/2 per cent on the second preferred stock and 1 1/4 per cent on the first preferred, all payable April 1.

The Harbison-Walker Refractories Company, regular quarterly, 1 1/2 per cent on the common stock, payable March 1.

The announcement is made that the Algoma Steel Corporation, a subsidiary of the Lake Superior Corporation, will on March 1 pay off its \$2,432,500 of outstanding 6 per cent notes. It is understood that a large amount of the notes already has been retired and that the money to meet the balance is in hand. This will save nearly \$150,000 a year in interest charges.

Bonuses and Wage Advances

The Kutztown Foundry & Machine Company, Kutztown, Pa., has paid a bonus to its employees of 12 1/2 per cent of earnings for the past three months, November-ber-January, inclusive.

The N. O. Nelson Mfg. Company, operating 17 plants in St. Louis, Mo., LeClaire, Ill., and in other parts of the country, has completed the allotment of about \$200,000 of stock in its company, through its profit-sharing methods, to its employees. All employees with the company longer than six months participate in the stock allotment. The salary of the employee determines the proportion of the stock which each receives.

The Kohler Company, Kohler, Sheboygan County, Wis., one of the largest manufacturers of enameled sanitary ware and plumbers' goods in the United States, has presented each employee with a free insurance policy, issued under the group plan by the Aetna of Hartford. The insurance does not interfere in any way with workmen's compensation provided by law.

The Crane Company, Bridgeport, Conn., has given its 2500 local employees an increase of 5 per cent in wages.

Landis Tool Company's New Factory

The Landis Tool Company has erected a new factory in Waynesboro, Pa., for the manufacture of an improved floor type of boring, milling, drilling and tapping machine. The building is of brick, concrete and steel fireproof construction, 105 x 176 ft., and is divided into three sections. The floor is of concrete, concrete tile is employed for the roof, and steel sash and partitions are installed throughout. The main bay is 60 ft. wide and 136 ft. long, and is spanned by a 10-ton electric crane. The machine shop, which is 45 ft. wide and 176 ft. long, parallels the main bay and has a sawtooth roof. One corner of the building is two stories high, the office and drawing room being located on the upper floor, with the wash and locker rooms underneath. A railroad siding runs into one end of the shop to facilitate the unloading of raw material and the shipping of the finished product, the traveling crane being used for this work.

New Hess-Bright Branch Offices

The Hess-Bright Mfg. Company, Philadelphia, announces the opening of two branch sales offices—one for Eastern territory at 1974 Broadway, New York, and one for the central section at 1036 Guardian Building, Cleveland. H. E. Brunner is in charge of the New York office, assisted by H. A. Fonda. The Cleveland office is under the direction of R. E. Clingan, assisted by Walter Rippion and M. S. McNay. The company's general sales manager, W. L. Batt, states that these offices are opened with the intention of giving more prompt and thorough attention to the ball-bearing requirements of the trade, both as to engineering and sales.

The Idaho Southern Railroad, which runs from Gooding to Jerome, Idaho, and the Milner & North Side Railroad, extending from Milner to Oakley, Idaho, comprising a total of approximately 50 miles, have been purchased by the Walter A. Zelnicker Supply Company, St. Louis. These abandoned railroads were built only a few years ago by Pittsburgh capital. It is understood the buyer will dismantle the roads and sell the rails and other equipment, which are practically new.

The use of metal fences is being advocated by the tenement house committee of the Charity Organization Society of New York to replace the high board fences which are commonly used to inclose back yards and which offer places for the accumulation of rubbish, increase fire hazards and cut off light. A circular is being distributed to building owners, showing that at current prices iron and wire fences may be erected for only a little more than the old board fence.

Pittsburgh and Nearby Districts

The Valley Mold & Iron Company, now operating a large plant at Sharpsville, Pa., making close to 1000 tons of ingot molds per day, will build a new plant near Ella furnace at West Middlesex, Pa., formerly owned by Pickands, Mather & Co., Cleveland, but bought recently by E. W. Mudge & Co., Frick Building, Pittsburgh. The new plant will have a capacity of about 200 tons of ingot molds per day, and its entire needs of Bessemer iron for making this output will come from Ella furnace. A steel building and some of the equipment for the new plant have already been purchased.

The new office building of the Carnegie Steel Company at Youngstown, was dedicated on the evening of Feb. 10 with a banquet attended by about 200 representatives of the Carnegie interests in Pittsburgh and elsewhere. The event occurred in the assembly room of the big office building and was featured by a musical and speech-making program of interest. Among those who spoke were J. H. Grose, superintendent; J. C. Barrett, blast-furnace superintendent; J. V. Schrock, chief clerk; Lee Van Metre, assistant chief clerk; A. C. Cook, chief claim agent; L. H. Burnett, assistant to Homer D. Williams, president Carnegie Steel Company; Capt. William Griffin, head of the safety department, and Harry Baugh, of the Union mill staff. The "History of the Bar Mills to Date" presented by J. V. Schrock, dated back to the time when the present Lower Mills were known as the Enterprise Iron Works.

It is not improbable that some of the former large holders of stock in the Youngstown Iron & Steel Company, who have sold their holdings to the Sharon Steel Hoop Company, will form a new company and erect an open-hearth steel plant and sheet mills in the Youngstown district. It is said that some of the former officials of the Youngstown Iron & Steel Company will not remain with the company under its new ownership, and have already discussed the matter of forming a new company. No definite plans have yet been made.

The Knox Pressed & Welded Steel Company, Pittsburgh, works at Wheatland, Pa., contemplates large additions to its plant that will greatly increase its capacity. The company has let a contract for an extension to its present main building, 110 x 105 ft. It will be equipped with machinery for the manufacture of the Knox line of pressed and welded steel products.

The Employers' Association of Pittsburgh has elected officers for 1917 as follows: A. L. Humphrey, president Westinghouse Air Brake Company, president; Edward Kneeland, United Engineering & Foundry Company, and William Frew Long, Lincoln Foundry Company, vice-presidents. Mr. Long is also general manager. Directors elected are Isaac W. Frank, United Engineering & Foundry Company; Mr. Humphrey, Biddle Arthurs, Simonds Mfg. Company; H. P. Davis, Westinghouse Electric & Mfg. Company; W. H. Hamilton, Rosedale Foundry & Machine Company; Pennock Hart, Mackintosh, Hemphill & Co.; John H. Ricketson, Jr., A. Garrison Foundry Company; C. J. Mesta, Mesta Machine Company; C. C. Smith, Union Steel Casting Company; W. D. Uptegraff, Union Switch & Signal Company; H. D. Wilson, Wilson-Snyder Mfg. Company; W. F. Long, H. P. Pears and John F. Casey.

The Haws Refractories Company, Johnstown, Pa., has been organized with a capital of \$250,000 to take over A. J. Haws & Sons, Ltd., manufacturer of silica, magnesite and clay, brick and tuyeres, sleeves and nozzles. The company is building a new plant at Lewistown, Pa., for the manufacture of silica brick only. The first unit will have a capacity of 60,000 brick per day, and the company expects to increase this to 120,000 per day. Officers of the new company are as follows: H. L. Tredennick, president; Harry D. Thomas, vice-president, and Campbell Patch, treasurer.

The demand for cranes from concerns in the Pittsburgh district is heavier now than at any time in some months. The Aluminum Company of America, the Colonial Steel Company and the Phillips Sheet & Tin

Plate Company have all been in the market recently for a considerable number. The Westinghouse Electric & Mfg. Company also has inquiries out for about 50, ranging up to 100 tons in capacity, for installation in its new plant to be built at Essington, Pa.

The General Electric Company recently purchased eight electric cranes to be installed in its new foundry at Erie, Pa.

The American Enameling & Mfg. Company, New Kensington, Pa., has been incorporated with a capital of \$10,000.

The National Chain Company, Marietta, Ohio, has been incorporated with a capital of \$150,000.

Stockholders of the Wheeling Steel & Iron Company, Wheeling, W. Va., have unanimously decided to increase the capital stock from \$7,500,000 to \$10,000,000.

The Standard Seamless Tube Company of Pittsburgh has filed notice with the State Department of Pennsylvania at Harrisburg, Pa., of an increase in stock from \$1,200,000 to \$1,500,000.

The Pittsburgh Screw & Bolt Company, Pittsburgh, filed notice of an increase in its stock from \$300,000 to \$3,000,000.

G. P. Bassett & Co., of Pittsburgh, has been incorporated under the laws of Pennsylvania to deal in pig iron, coke, etc. The incorporators are George P. Bassett, John K. Barber and David D. Bradford, all of Pittsburgh.

On account of the high prices of materials and labor, together with delayed deliveries, the Republic Iron & Steel Company has decided to defer its project of substituting electricity for steam in its various plants in the Youngstown district.

The stockholders of the Westinghouse Electric & Mfg. Company, East Pittsburgh, at a special meeting held last week, unanimously approved an increase in the capital stock from \$60,000,000 to \$75,000,000. The additional stock will be common and will consist of 300 shares of a par value of \$50.

The Union Electric Steel Company, Carnegie, Pa., expects to start operations about April 1. It is installing one 6-ton Heroult electric furnace, and has placed an order for another of the same capacity to make high-grade alloy steels. H. A. Murphy, 206 Keystone Bank Building, Pittsburgh, is treasurer of the company.

The Walker Foundry & Machine Company, recently organized will build a plant at New Florence, Pa., near Johnstown, for the manufacture of gray-iron castings.

The monthly meeting of the Pittsburgh Foundrymen's Association was held in the Fort Pitt Hotel in that city on Monday evening, preceded by a dinner. George L. Grimes, Midland Machine Company, Detroit, Mich., gave a talk on molding machines, illustrated with lantern slides. Motion pictures were also given of the foundry of the Packard Motor Car Company, Detroit, showing how this company molds its cylinders, how the molders core-up the molds and how the cores are gaged. Views were also displayed of the pouring and shaking-out process, and how rigidly the cylinders are inspected. Another film covered the molding, closing and pouring of an automobile transmission case and the molding of an automobile exhaust manifold.

The Department of Railways and Canals of the Canadian Government, Ottawa, has an inquiry out for 1830 tons of angle bars, 200 tons of track bolts with Harvey grip thread, and about 6000 kegs of railroad spikes for delivery from June 15 to Sept. 1 next.

The Heppenstall Forge & Knife Company, Pittsburgh, is installing a 6-ton Heroult electric furnace to make high grade steels for its own use. Barton R. Shover, Diamond Bank Building, Pittsburgh, is consulting engineer for the work.

The new 9-in. bar mill at the plant of the Youngstown Sheet & Tube Company, Youngstown, has been started, and is running successfully.

Some Pittsburgh and Youngstown capitalists are reported to have bought about 100 acres near Warren, Ohio, on which it is proposed to build an open-hearth steel plant and finishing mills. Details of the project are not yet available.

Machinery Markets and News of the Works

TRAFFIC SITUATION WORSE

Coal and Material Famine Menaces Shops

New York Central Issues List in Cleveland— Delaware & Hudson to Buy—Grand Trunk System Issues Big List

The far-reaching effects of the traffic situation are illustrated by the machinery markets. No section of the country has escaped harm.

It not only is impossible to get shipments to the seaboard, but in most cases impossible to find ocean freight space for the consignments waiting to be forwarded to foreign countries. One effect of the tie-up is that disappointed exporters have offered machines at concessions from the manufacturers' prices, thereby hoping to avoid losses. It is predicted that some of the smaller exporting houses will be forced out of business.

In the Pacific Northwest, 15,000 carloads of lumber are awaiting transcontinental shipment. In the Central South, the iron and steel trades are worried. Milwaukee calls the tie-up the worst ever known. Manufacturers in Detroit are struggling to get raw materials and coal, just as they are elsewhere, and fear is growing that shut-downs may be necessary. San Francisco reports the Orient is buying, but that shipping from that port is restricted. St. Louis also dwells on the railroad embargoes.

Meanwhile there is a good volume of small-lot buying throughout the country, and evidence that important railroad buying is impending. Details are lacking, but it is likely that news will soon be available about a purchase of 500 automatic machines, the value of which is over \$500,000.

In Cleveland the New York Central Railroad has issued a list of about 20 machine tools for delivery at Elkhart, Ind.

The Delaware & Hudson Railroad is expected to issue a list at an early date for its Colonie shops, Watervliet, N. Y.

The Grand Trunk Railway System, Montreal, Canada, has issued a big list of general equipment for its Port Huron, Mich., shops.

Some notable inquiries for cranes are before the builders in the East. All are big propositions. Deliveries of cranes are still a good way ahead, and their construction is hampered by the difficulty of obtaining electrical equipment.

New York

NEW YORK, Feb. 21, 1917.

Export shipping conditions are bad, but equally as serious is the difficulty of getting machinery to the seaboard. The larger export companies seem to be suffering from the scarcity of ocean freight space to a less extent than the smaller companies, with the result that some of the latter have been offering machine tools at prices lower than those quoted by the manufacturers. These machines are offered, of course, because of the inability of the exporters to find ocean freight space.

Another phase of the situation is that the inability to ship not only ties up large amounts of money, but it also means that losses are faced unless deliveries are made. If present conditions continue it is regarded as not at all improbable

that some of the small exporters may be driven out of business. In some cases representatives of exporting houses have returned to this country in the hope that by presenting first-hand information as to the seriousness of the situation they may be able to obtain some relief.

A dealer in New York says that it is almost impossible to get machines through from the West, while another seller has machines ready for shipment, but his company cannot get them started east.

With most of the dealers in standard machine tools inquiries are plentiful, though actual closing is proceeding more slowly than was the case a few weeks ago. On the other hand, some large business has been placed by a few buyers, notably the General Electric Company, which continues to place orders for delivery to Schenectady and Erie, and also is inquiring for 16 turret lathes, ranging from small hand screw machines to large tools for delivery at Philadelphia. It is understood that the company will transfer some of its switch work to that city.

It is reported that an Ohio maker of automatics has received an order for about 500 machines, the value of which will be over \$500,000, details of which will be forthcoming later.

It is expected that the Delaware & Hudson Railroad will soon issue a list of tools contemplated for its Colonie shops at Watervliet, N. Y.

The New London Ship & Engine Company, New London, Conn., has been a recent buyer. The Brooklyn Navy Yard, Feb. 16 and 17, opened bids on a number of machines.

Russian buyers in New York are more active than in recent months, but they are not placing big orders.

Some inquiries for extremely large cranes are before the makers. The William Cramp & Sons Ship & Engine Building Company is inquiring for two 30-ton cranes having a span of 150 ft.; also for a hammer-head crane, the specifications of which require that it shall be 100 ft. high in the clear above foundations, have an arm 95 to 100 ft. long, and be capable of lifting 200 tons 70 ft. from the center. The latter is so novel a proposition that it is doubtful how many crane builders will submit estimates.

The Utah Copper Company is inquiring for a 50-ton, 3-motor traveling crane for western shipment.

Deliveries of cranes are still several months away, so that the fact that inquiries are lighter is not a source of worry to the builders. Deliveries of electrical equipment are especially backward.

The Sun Shipbuilding Company, Philadelphia, Pa., is in the market for a number of punches and shears.

The Buffalo, Rochester & Pittsburgh Railway Company, Rochester, N. Y., is having tentative plans drawn with a view to erecting a power house, machine shop, blacksmith shop, storehouse, coaling station and additions to its roundhouse, which if carried out will cost about \$200,000. D. S. Jones is assistant to the president.

The Lehigh Valley Railroad plans the electrification of its main line through the Pennsylvania mountains, probably from Easton to Wilkes-Barre, and the applying of the same motive power to the branches in the anthracite region. Aside from these projects, the railroad will spend about \$5,000,000 for improvements this year, plans already having been made. This will mean a total expenditure of \$11,000,000 for 1917.

The W. L. Battery Company, Poughkeepsie, N. Y., incorporated with a capital stock of \$100,000, has bought out the business of Frederick Wright, inventor of a storage battery, who severed his connection with the Wright Storage Battery Company, Poughkeepsie, in 1914. It has established a plant with an output of about 35 batteries per day, which is rapidly increasing. It will gradually add to this up to about 500 batteries per week, at which time it will have plans formed for the construction of a new factory. The officers and directors are D. W. Wilbur, president; W. H. Lyall, treasurer and C. W. H. Arnold, secretary.

The Standard Electric Fittings Company, Stamford, Conn., has had plans prepared by F. H. Ogden & Co., Newark, N. J., for the erection of a one-story plant at Elizabeth, N. J., 100 x 340 ft., covering about 36,000 sq. ft. floor space, to be used for the manufacture of conduit fittings, cable boxes and other electrical appliances.

The Bossert Company, Utica, N. Y., manufacturer of sheet-metal stampings, has been taken over by the Bossert Corpora-

tion, recently incorporated with a capital stock of \$1,100,000. There will be no change in the management or control of the company and none in the operation of its business, except that a new plant may be put up to take care of expansion. James R. Jones is general manager and Gilbert Butler is secretary and treasurer.

The M. L. Oberdorfer Brass Company, founder and manufacturer, Syracuse, N. Y., has awarded contract for a two-story addition to its plant, 50 x 100 ft., for a complete core department, which will allow for the expansion of its foundry. The increase will about double the present capacity and will give it an output of about 4,000,000 lb. of aluminum castings per year. About 175 workmen are now employed at the plant. Jonas L. Oberdorfer is vice-president.

The Corrugated Bar Company, Mutual Life Building, Buffalo, N. Y., will purchase a vertical bar shear with knives 15 to 18 in. long to shear not less than 2½-in. rounds, also a 10 or 15-ton traveling crane of 70 to 80-ft. span of the three or four motor type for a 220-volt direct or a three-phase sixty-cycle alternating current.

The Buffalo Bolt Company, Buffalo, N. Y., is in the market for a 5 or 10-ton crane to span or to remodel to span 75 ft. 8 in., and to operate on a 220-volt direct current.

The West Side Foundry Company, Troy, N. Y., is seeking a new or second-hand gasoline motor-driven locomotive.

The Amper Lock & Switch Corporation, Buffalo, has been incorporated with a capital stock of \$100,000 to manufacture locks, switches, electrical machinery, etc. W. H. Farnsworth, 937 Main Street; A. L. Higley, 920 Niagara Street, and W. H. H. Davenport, 219 Ellicott Square Building, Buffalo, are the incorporators.

The Tailors' Automatic Iron Lifter Company, Rochester, has been incorporated with a capital stock of \$25,000 to manufacture a patented device for tailors' use. J. Russell Borzilieri, Elwood Building, is manager.

The Jamestown Mantel Company, Jamestown, N. Y., will erect a three-story addition to its factory at Valatie, N. Y.

Among recent increases of capital stock reported by the Secretary of State, Albany, N. Y., are the following: The L. C. Blanck Company, 10 Thomas Street, New York, tool steels, \$100,000 to \$500,000; the Columbia Machine Works & Malleable Iron Company, 269 Chestnut Street, Brooklyn, N. Y., \$300,000 to \$900,000; the Jewell Steel & Malleable Company, Buffalo, N. Y., manufacturer of castings, \$50,000 to \$125,000; and the Mohawk Brush Company, Albany, N. Y., \$50,000 to \$125,000.

Contract has been awarded to the J. G. White Engineering Company, 43 Exchange Place, New York, for the erection and installation of a steam power plant for the Virginia-Western Power Company, Clifton Forge, Va., to be located at Roncoverte, W. Va. The initial installation will be of 5000 kw, with provision for an ultimate capacity of approximately 30,000 kw.

The Martin Dennis Company, 859 Summer Avenue, Newark, N. J., manufacturer of tanners' chemicals and products, has increased its capital from \$600,000 to \$1,000,000, for business extensions.

The Eagle Picher Lead Company, Newark, N. J., has filed plans for the erection of a one-story blacksmith shop, 24 x 36 ft., at the foot of Blanchard Street. A new pump house, 20 x 21 ft., will also be erected.

The Balbach Smelting & Refining Company, 580 Market Street, Newark, N. J., has filed plans for a one-story addition, 36 x 140 ft., to its plant at Avenue R and Doremus Avenue.

The Gerhard Mennen Chemical Company, 42 Orange Street, Newark, N. J., manufacturer of toilet preparations, has increased its capital from \$50,000 to \$1,000,000 for business extensions.

The Seaboard By-Products Coke Company, Kearny, N. J., has filed plans for new additions at its plant now in course of construction on the Hackensack River, to cost \$49,000.

The Ford Motor Company, Detroit, Mich., has had plans prepared for a four-story concrete plant, 200 ft. long, to be erected along the Passaic River, near the Lincoln Highway, Kearny, N. J., as the first unit of its proposed automobile works on this site. It is said that the company will remove its present plant at Long Island City to this new location.

The Union Terminal Cold Storage Company, Twelfth Street, Jersey City, N. J., will build a new eight-story and basement cold-storage plant, 100 x 100 ft., fronting on Twelfth Street. The company is also preparing plans for the erection of an addition to its power plant. The capital stock was recently increased from \$450,000 to \$750,000, to provide for these extensions. T. Adams is president.

The Goetze Gasket & Packing Company, New Brunswick, N. J., has been incorporated with a capital of \$50,000 to manufacture gaskets and kindred engineering specialties. Zeno Schultz, Hede Schultz and Walter Gierlich, New Brunswick, are the incorporators.

The Roessler & Hasslacher Chemical Company, 52 Fayette Street, Perth Amboy, N. J., will build a one-story addition to its plant, 50 x 128 ft., to cost \$12,000.

The Wickham Piano Plate Company, Springfield, Ohio, has acquired the plant of the Matawan Steel & Iron Company, Church Street, Matawan, N. J., as a branch plant. A concrete foundry building will be erected. The company is also considering extensive improvements in the present buildings.

The Great Lakes Dredge & Dock Company, 17 Battery Place, New York City, has filed notice at Trenton, N. J., of increase in its capital from \$6,000,000 to \$8,000,000.

The Garrett Foundry, 43 McDonough Street, Brooklyn, N. Y., has been incorporated with available operating capital of \$53,000 to specialize in iron, steel and brass castings and manganese products. J. C. Garrett, C. H. Fowler and A. W. Trotter are the incorporators.

Philadelphia

PHILADELPHIA, PA., Feb. 19, 1917.

The Germantown Tool Works, manufacturer of edged tools and handled hammers, 520 Commerce Street, Philadelphia, is in the market for second-hand board drop hammers of from 1000 to 1500 lb. John R. Griffiths and Samuel F. Wilson are the proprietors.

The Midvale Steel Company, Philadelphia, is taking bids for the erection of a one-story, steel and concrete addition, 65 x 79 ft., to its machine shop at Nicetown.

Herman L. Winterer, Philadelphia, has had plans prepared for a three-story brick and concrete machine shop, 70 x 115 ft., to be erected at 943-53 North Front Street. Bids for erection now being taken.

A power house, 70 x 160 ft., will be erected by Charles Christos, 2821 Helen Street, Philadelphia, at his new dyeing and textile mill to be built at Hunting Park Avenue and Stockley Street.

The Pennsylvania Wheel Company, Wayne Junction, Philadelphia, has filed plans for a one-story shop addition, 26 x 38 ft., at Wayne Avenue and Berkley Street.

The Philadelphia Gear Works, 1120 Vine Street, Philadelphia, will take bids Feb. 23 for an addition to its machine shop.

The Lawndale Steel Company, Philadelphia, will build a new one-story addition to its plant, 50 x 115 ft., at Oxford and Devereux streets.

The Henry H. Shep Mfg. Company, Philadelphia, manufacturer of planing mill products, has had plans prepared for an addition to its plant at Sixth and Columbia streets.

The Modern Safety Gas Iron Company, Philadelphia, has been incorporated with a capital of \$15,000 to manufacture gas irons. Harry Fischer, Philadelphia, is treasurer.

The American Metal Works, 314 Armat Street, Philadelphia, has awarded a contract for the erection of a two-story addition, 40 x 110 ft., to its plant at Germantown. I. T. Shoemaker, Philadelphia, is the contractor.

Charles S. Harper and Chandler Weaver, Philadelphia, and associates, have incorporated in Delaware, the Foss Pulverized Coal Burning Company, with a capital stock of \$100,000, to manufacture the Foss centrifugal coal pulverizing mill and coal burners. William S. Pitts, New York, is also active in the company.

The Baldwin Locomotive Works, 500 North Broad Street, Philadelphia, has awarded contract for the erection of an addition to its foundry at Eddystone to James Kelly, contractor, Bulletin Building, Philadelphia.

Fire Feb. 12 destroyed the mixing plant and machinery of the Barber Asphalt Paving Company, 237-243 North Thirteenth Street, Philadelphia, with loss estimated at \$10,000.

S. F. and Israel Spielberg and N. N. Gittis, Philadelphia, have incorporated in Delaware the American Barber Tool Company, to manufacture barbers' tools and supplies.

The Merchant & Evans Company, 517 Arch Street, Philadelphia, manufacturers of roofing, metal ceiling, cornices, etc., has filed plans for alterations and improvements in its foundry at 2035 Washington Avenue, to cost about \$1,100.

Fire Feb. 8 damaged the machine repair shop of the Mt. Vernon Machine Works, Levesington Avenue, Manyunk, Philadelphia.

The Congoleum Company, Marcus Hook, Pa., will build a new brick and concrete boiler plant at its linoleum works, 50 x 82 ft.

The Oneida Fountain Supply Company, Kane, Pa., has been incorporated with a capital of \$100,000 to manufacture fountains, freezers and kindred products. R. A. Hill, Kane, is president.

The plant of the Reading Casting Company, 1432 Mulberry Street, Reading, Pa., sustained a loss of about \$20,000.

through fire Feb. 5. The plant specializes in iron and steel castings.

The Norristown Magnesia & Asbestos Company, Norristown, Pa., manufacturer of asbestos coverings and kindred specialties, is planning the establishment of a branch plant at Doylestown.

The Philadelphia & Reading Railroad is planning for the enlargement of its repair shops at St. Clair, Pa., in the spring. The company is making this plant the principal one for car and locomotive repair work of all kinds in this section, and has recently removed machinery and equipment located at Schuylkill Haven to the local shops.

The John Wood Mfg. Company, Conshohocken, Pa., manufacturer of boilers, tanks, and similar products, has placed its new foundry near Fayette Street in operation. The plant will specialize in brass castings.

The Springfield Tire Company, Cumberland, Md., is taking bids for the erection of an addition to its plant, requiring about 6000 tons of structural steel.

New England

BOSTON, MASS., Feb. 19, 1917.

The Lapointe Machine Tool Company, Hudson, Mass., has been incorporated with capital stock of \$200,000. The incorporators are John J. Prindiville, Framingham, Mass., president and treasurer; Edward P. Maguire and C. P. Brown.

The Bridgeport Safety Emery Wheel Company, Bridgeport, Conn., has increased its capital stock from \$55,000 to \$61,000.

The Traffic Sign & Signal Company, Gloucester, Mass., has been incorporated with capital stock of \$6,000. The directors are H. C. Stout, president; Hosea C. Tufts, Gloucester, treasurer, and T. J. Carroll.

The Bosworth Machine Company, Milford, Conn., has increased its capital stock \$17,375.

The Bantam Anti-Friction Company, Litchfield, Conn., has changed its name to the Bantam Ball Bearing Company.

The Pilling Brass Company, Waterbury, Conn., is having plans drawn for an addition, 100 x 200 ft., one story, with wings, 50 x 80 ft. and 50 x 100 ft.

The Waterbury Rolling Mills Company, Waterbury, Conn., has awarded a contract for three additions, 65 x 150 ft., one story, 32 x 150 ft., and 19 x 66 ft.

The New London Ship & Engine Company, Groton, Conn., has awarded a contract for an addition, 20 x 116 ft., and for another story on a building, 60 x 116 ft.

The Smith & Anthony Company, Wakefield, Mass., closed its stove foundry and retired from manufacturing activity Feb. 17. This action was taken by the heirs of the late E. W. Anthony to settle the estate. The foundry was opened in 1856 and was the first large industry in the town.

Joseph Willmann, president of the Derby Mfg. Company, Derby, Conn., is the head of a new company which will manufacture crucibles for brass melting in the old plant of the Derby Paper Company.

The J. N. Lapointe Company, New London, Conn., has purchased a tract of land on Main Street, Hudson, Mass., and it is reported that the erection of a new plant will be begun in the spring. J. N. Lapointe is president and treasurer of the company and his son, Ralph R. Lapointe, formerly superintendent of the Lapointe Machine Tool Company, Hudson, will have charge of the business.

The Remington Bridgeport Works, Boston Avenue, Bridgeport, Conn., is in the market for two 150-hp., 72-in. x 16 ft., Phoenix boilers, guaranteed 125-lb. pressure, either new or second-hand.

Baltimore

BALTIMORE, MD., Feb. 19, 1917.

The Chesapeake Machine Company, Oxford, Md., has been incorporated with a capital stock of \$100,000 by George M. Wingard, Joseph G. Robertson and Meyer D. Goldman to manufacture patent worm drive axles for auto trucks, etc. It plans to take over an existing plant and will need only a few extra machines, such as broachers and a slab miller.

The Rowan Electric Mfg. Corporation, 501-508 Garrett Building, Baltimore, has been incorporated with \$400,000 capital stock to manufacture automatic starters, switchboards, etc. The incorporators are Benjamin H. Cram, D. Meredith Reese and John S. Rowan.

The Richards Phonograph Record Repeater Company, 440 Equitable Building, Baltimore, has been incorporated with \$100,000 capital stock to manufacture a phonograph record repeater and kindred specialties. The incorporators are John Owens, Albert C. Eastman and Leo A. Bowes.

The Ohio Mfg. Company, 116 Law Building, Baltimore, has been incorporated with \$100,000 capital stock to manufacture steam engines, machinery, mechanical appliances, etc. The incorporators are Patrick Rose, Edward C. Kaufman, James B. Gillespie and Antonio Parrini.

The Spedden Shipbuilding Company, Boston Street and Kenwood Avenue, Baltimore, has been incorporated with \$500,000 capital stock by Howard M. Addison, Enos S. Stockbridge and E. McClure Rouzer.

The Mifflin Shipbuilding Company has been incorporated at Dover, Del., with a capital stock of \$10,000,000 and, it is announced, plans to locate a plant on the Delaware River, south of Claymont, Pa. The incorporators are A. G. Steelman, C. P. Cannon and C. L. Damby, all of Philadelphia.

Chicago

CHICAGO, ILL., Feb. 19, 1917.

J. W. Harrison, formerly of the National Car Coupler Company, Attica, Ind., will erect an open-hearth steel foundry at Murphysboro, Ill., for the operation of which the Harrison Steel Castings Company, Inc., has been formed, with a capital of \$300,000. It is expected that the plant will be in operation by Sept. 1 of this year. Two steel and brick buildings are to be erected, one a foundry building, 180 x 260 ft., and the other a cleaning room, 140 x 160 ft., with an additional building for the sand blast department. The plant will have two 15-ton open-hearth furnaces designed for the use of either oil or powdered coal. The foundry building will be spanned by one 25-ton and one 10-ton traveling crane, and the cleaning room by one 10-ton crane. The officers of the company are J. W. Harrison, president; R. J. Harrison, vice-president, and G. W. Harrison, secretary and treasurer. The company will have a Chicago office at 522 McCormick building.

The Grand Trunk Railway System, Montreal, Canada, of which G. W. Caye is general purchasing agent, has issued a large list of miscellaneous shop equipment required for its new shops at Port Huron, Mich. For the various shops over 100 items are enumerated, and bids are to be submitted not later than March 5. The items are too numerous to be given here, but it may be stated that the tools required embrace miscellaneous railroad shop equipment. Aside from the machine shop, a cabinet, freight, pipe fitters', electricians', blacksmith and forge shops are to be equipped.

The Duffin Iron Company, Chicago, has purchased a tract of land at Kedzie Avenue and Forty-ninth Street, upon which it will erect a new plant for the greater development of its business than is possible in its present location. The company operates a shop for fabricating iron and steel.

The Morgan Pattern Works, 18 North Morgan Street, Chicago, has plans for a two-story shop to cost \$4,000.

M. Frank Strauch, architect, 1356 Diversey Parkway, Chicago, is preparing plans for a two-story machine shop, 100 x 100 ft., to be erected on Lake near Ann Street, and will receive bids early next month.

The City Ice & Supply Company, 1516 East Seventy-second Street, Chicago, has had plans prepared for a one-story brick artificial ice plant, estimated to cost \$35,000.

The Illinois Metal Block Corporation, Chicago, has been organized with a capital of \$2,400 by Howard Baker, Turington Harvey and Harry H. Hunter, 224 West Sixty-fourth Street.

The Chicago Motor Bus Company, 11 South LaSalle Street, Chicago, has had plans prepared for a one-story garage, 100 x 150 ft., to be erected at 6307-13 Broadway, at a cost of \$26,000. Jarvis Hunt, 30 North Michigan Avenue, is the architect.

The Sherwin-Williams Company, 115th Street and Kensington Avenue, Chicago, will build a two-story factory, 60 x 80 ft., to cost \$20,000.

F. Gablowski, 2502 West Division Street, Chicago, will build a one-story brick factory at 1832-34 North Laramie Avenue, to cost \$4,500.

Work is soon to be started on a \$45,000 addition to the recently completed Universal tractor plant of the Moline Plow Company at Rock Island, Ill.

Fire destroyed the plant of the Republic Fence Company at North Chicago, Ill. The estimated loss is \$25,000.

The M. & H. Foundry Company, Belleville, Ill., has filed a voluntary petition in bankruptcy. The assets are listed at \$23,000 and the liabilities at \$45,000.

The Redden Motor Truck Company, 1442 South Michigan Avenue, Chicago, has been incorporated with a capital stock of 200,000 shares of no par value, and stock will be issued to bring the company an initial working capital of about \$1,000,000. The board of directors will consist of a number of New

York and Chicago bankers. Manufacturing plans are to build 25,000 one-ton trucks during 1917 for attachment to a Ford chassis. C. F. Redden is president. The company will also adapt its trucks for attachment to other automobile chassis.

Des Moines Steel Company, Fourth and Tuttle streets, Des Moines, Iowa, has increased its capital stock from \$10,000 to \$100,000. It is erecting a building which will more than double its present capacity. J. E. Van Liew is president.

A special meeting of the stockholders of the Belleville Malleable Iron Company, Belleville, Ill., will be held in the offices of the company Feb. 21 for the purpose of submitting to the stockholders a proposition to increase the capitalization of the company from \$2,500 to \$200,000 and to increase the number of directors from three to seven.

The Denver Rock Drill Company, Denver, Col., has plans for a new office building and machine shops, to cost \$100,000.

Indianapolis

INDIANAPOLIS, IND., Feb. 19, 1917.

The Richmond Malleable Iron Foundry, Richmond, Ind., recently organized with \$100,000 capital stock, began operations Feb. 15 with 200 men.

The plant of the American Car & Foundry Company, Jeffersonville, Ind., has shortened its running schedule from 10 hours to 9 hours on account of a shortage of material in the steel shops.

The Hoosier Sub-Carburetor Company, Dunkirk, Ind., has increased its capital stock from \$10,000 to \$25,000.

The Weil Boiler Company, 1601 Van Buren Street, Indianapolis, has been sold to the Kewanee Boiler Company, Kewanee, Ill., for \$70,000. There will be no change in name, business administration or policy. The officers of the Weil Company are Isador Weil, Chicago, president; Benjamin Weil, Indianapolis, vice-president, and C. T. Kingston, Indianapolis, secretary and treasurer. The officers of the Kewanee Company are Emerit E. Baker, president; B. F. Baker, vice-president and treasurer, and M. S. Moore, manager. R. M. Powers is superintendent of the Indianapolis branch.

The Boswell & Sons Company, Indianapolis, has been incorporated with \$15,000 capital stock to manufacture automobile accessories. The directors are John B., Charles G. Boswell and Ralph W. Boswell.

The Durable Motor Truck Company, capitalized at \$500,000, has bought the factory at Calumet Park, near Hammond, Ind., of the National Service Guard Company, Chicago. The site consists of ten acres and the buildings have 25,000 sq. ft. of floorspace. The company will manufacture motor trucks for farming work.

The Alfred Alltimes Biscuit Machinery Company, Indianapolis, has filed preliminary articles of dissolution.

The Sanborn Electric Company, Indianapolis, manufacturer of electrical supplies, has issued \$100,000 of preferred stock.

The Specialty Case Company, Kendallville, Ind., has changed its name to the Specialty Display Case Company and has increased its capital stock from \$50,000 to \$375,000. R. J. Keller is president and A. M. Jacobs, secretary and treasurer.

The McKinley & Lancaster planing mill, Bedford, Ind., was destroyed by fire Feb. 14 with a loss of \$2,000 on machinery.

The National Mill Supply Company, Ft. Wayne, Ind., has increased its capital stock from \$100,000 to \$500,000.

The American Exploitation Company, Evansville, Ind., has been incorporated with \$12,000 capital stock to develop patents. The directors are James M. Stafford, Henry J. Graf and Arthur C. Stone.

The Bill Mfg. Company, Laporte, Ind., has been incorporated with \$10,000 capital stock to manufacture automobile accessories. The directors are J. J. Ohlis, F. A. Flocken and C. D. Hudnut.

The Kloebl Gas Stove & Heater Company, Marion, Ind., has increased its capital stock from \$10,000 to \$55,000.

The Richmond Gravel Company, Richmond, Ind., has increased its capital stock from \$10,000 to \$35,000.

The Hill-Standard Company, Anderson, Ind., has been incorporated with a capital stock of \$600,000. The directors are Hugh Hill, James M. Starr, Walter H. Fairchild, Isaac C. Ash and Clayton E. Cheesman. The plant of the Hill-Cheesman Mfg. Company, Toledo, Ohio, is to be consolidated with the Hill-Standard factory at Anderson. The capacity of the latter will be doubled. Buildings to cost \$40,000 are to be erected. The company has orders for more than 1,000,000 wheels for children's vehicles, and will add the manufacture of wheels for farm machinery.

The American Sanitary Lock Company, Indianapolis, incorporated with \$120,000 capital stock, is a reorganization of the American Sanitary Lock Company, manufacturer of sanitary, coin-controlled locks. The directors are Leo Kahn, Jackiel W. Joseph and Charles A. Bookwalter.

The Johnson Acetylene Gas Company, Crawfordsville, Ind., has increased its capital stock from \$10,000 to \$25,000.

The Indiana Truck Corporation, Marion, Ind., has been incorporated with a capital of \$1,000,000 by C. G. Barley, J. W. Stephenson, S. W. Winder and G. C. Harwood to manufacture motor vehicles.

The Warner Gear Company, Muncie, Ind., manufacturer of automobile parts, has announced that in the early spring it will erect new buildings and increase the capacity of its plant.

The foundry department of the Cup & Metal Works, Hartford City, Ind., was destroyed by fire, with a loss of \$4,000.

Cleveland

CLEVELAND, OHIO, Feb. 19, 1917.

The demand for machinery in small lots has improved and is more active than for some time. Inquiries are largely for one or two machines. A considerable call for milling and planing machines and an increased demand for lathes are noted. Several inquiries are pending for heavy types of machine tools. Many plants are anticipating their requirements and placing orders for machines that they do not expect to need for several months. Owing to delays in building operations several manufacturers who are erecting additions are getting deliveries on round lots of machinery ordered some time ago, considerably earlier than the equipment is needed. Wood-working machinery is moving freely and the demand for motors is heavy. Local jobbing machine shops appear to be as badly crowded with work as at any time in the past year. A large share of this is for automobile manufacturers. The demand for castings is very heavy and local plants are running at as full capacity as they can with the supply of labor. A scarcity of common labor exists in the foundries, but molders are fairly plentiful.

The New York Central Railroad, through its purchasing department in Cleveland, has issued the following list of machinery requirements for its Elkhart, Ind., shops:

- One 6000-lb. steam hammer.
- One 32-in. draw cut shaping machine.
- One 90-in. driving wheel lathe.
- One 36-in. planing machine.
- One blacksmith's blower.
- One 800-ton wheel press.
- One 24-in. lathe.
- One 26-in. turret lathe.
- One 42-in. cold sawing machine.
- One 16-in. bolt lathe.
- One 60-in. horizontal boring and milling machine.
- One 5-ft. radial drilling machine.
- One 5-ft. high-speed universal radial drilling machine.
- One 24-in. high-duty shaping machine.
- One heavy-duty horizontal slab milling machine.
- One 36-in. heavy vertical milling machine.
- One hand planer and jointer.
- Two speed lathes.

The Baxter Gear Cutting & Mfg. Company, 1831 East Fifty-fifth Street, Cleveland, will shortly place contracts for a new plant, one story, 80 x 160 ft., on East Seventy-ninth Street, near Woodland Avenue, which will increase its capacity about 200 per cent. Some machine-tool equipment has been purchased, but more will be required, particularly gear cutters and turret lathes.

The K & M Casting Company, 10,601 Quincy Avenue, Cleveland, will shortly begin the erection of a new aluminum and brass foundry for general jobbing business, but will also specialize on automobile work, particularly crank cases. Some new equipment will be required.

The Grant-Lees Gear Company, Cleveland, maker of automobile transmissions, has under way an extension providing 30,000 additional square feet of floor space and doubling the capacity of its plant. It will be completed early in the spring.

The Van Dorn-Dutton Company, Cleveland, manufacturer of automobile gears, will shortly extend its line in this field by the manufacture of complete differentials for automobiles weighing from 2800 to 3600 lb. and up to 60 hp.

The Shields Machine Company, Whitney Power Building, Cleveland, has been incorporated with a capital stock of \$250,000 to succeed the Shields Machine & Tool Company, maker of automobile parts. It will enlarge the capacity of the plant and is contemplating additions to its products.

The Advance Mfg. & Tool Company, Cleveland, has been

incorporated with a capital stock of \$20,000 by E. E. John, C. H. Bell and others.

The Faultless Anchor Company, Fostoria, Ohio, maker of fence anchors, having outgrown its present quarters, will erect an up-to-date plant on a new site in the spring.

The Superior Brass Mfg. Company, Mansfield, Ohio, has been formed with a capital stock of \$35,000 and will erect a plant, including a foundry and finishing department, 40 x 105 ft., for the manufacture of brass specialties. W. J. Spreng is president and Fred T. Bristor, secretary.

The Toledo Cooker Company, Toledo, Ohio, maker of fireless cookers, will add a machine shop to its plant for making dies and some special machinery.

The Willys-Morrow Company, Toledo, has been incorporated with a capital stock of \$100,000 by N. E. Hutchens and others to manufacture automobile parts.

The Farrel-Cheek Foundry Company, Sandusky, Ohio, has placed a contract for the erection of an addition to its foundry, 100 x 100 ft.

The East Iron & Machine Company, Lima, Ohio, has increased its capital stock from \$125,000 to \$400,000, necessitated by its growing business and, it is stated, by contemplated plant extensions and improvements.

The Central Construction Company, Wooster, Ohio, will build a steel fabricating shop, 40 x 75 ft.

The Conneaut Shovel Company, Conneaut, Ohio, has increased its capital stock from \$150,000 to \$300,000. Extensions are contemplated.

The Ladel Mfg. Company, New Philadelphia, Ohio, has completed plans for its one-story foundry and machine shop, 150 x 300 ft.

Detroit

DETROIT, MICH., Feb. 19, 1917.

Manufacturers in this district are too occupied in an endeavor to get raw materials and coal to keep their plants running to consider the installation of additional machinery, and as a result the machinery market is dull. Shortage of materials is seriously affecting the larger local factories, and many are faced with a shut-down. The finished product is also tied up by the freight congestion, and \$11,000,000 worth of automobiles alone are stored awaiting shipment. No relief is in sight in the shortage of coal, and conditions are made worse by the announcement of the Detroit Edison Company that power which is furnished to a number of the larger factories of the city will have to be cut off early this week unless a large amount of coal breaks through the various embargoes.

Machine-tool jobbers are expecting large orders, believing that Detroit will shortly be manufacturing aeroplanes on a large scale. The pending naval bill carrying an item of \$1,000,000 for the purchase of the Wright-Martin patents will enable the Packard Motor Car Company, which has been contemplating the manufacture of airplanes for several years, and other companies already suitably equipped, to turn out many thousand a year. The Packard Company has a large department devoted to experimental work, and has recently perfected an aeroplane motor.

J. J. Roura, Jr., 1540 Penobscot Building, Detroit, Mich., is in the market for the following structural shop equipment: a 12-in. beam punch, a compression riveter, a radial drill with 3-ft. arm, a belt-driven 9 x 9 in. air compressor, a 20-in. Lee press, a No. 18 Lee & Simplex cold saw or equivalent, a double-end grinding machine, an acetylene outfit and small shop tools.

The Columbia Motors Company, Detroit, is planning the erection of a factory to be started at once.

A company to manufacture a seamless wood canoe to be known as the Arex has been incorporated at Ludington, Mich., with a capitalization of \$100,000. Machinery is being installed in the building formerly occupied by the Tubbs Mfg. Company. The officers are Henry L. Hastell, Ludington, president and general manager; E. R. Mayercord, Chicago, vice-president, and A. L. Kinney, Ludington, secretary and treasurer.

The Campbell Transmission Company has been organized in Buchanan, Mich., with a capital stock of \$250,000.

A company to manufacture the Universal Check Valve and a new automobile door catch is being organized in Alma, Mich., by E. W. Reemtsen of Alma.

The Velt Mfg. Company, Holland, Mich., has started operations in a new plant.

The Hayes Motor Truck Wheel Company, St. Johns, Mich., is installing new dry kilns and machinery. Additional buildings will be started soon. C. B. Hayes, Jackson, Mich., is president.

The Porter Body Company has succeeded the Globe Truck Company, Ypsilanti, Mich., and is ready to manufacture bodies, trailers and auto parts. A new factory will be constructed in the spring. David Killins, Ann Arbor, Mich., is president, and G. E. Porter, Ypsilanti, Mich., general manager.

The Duplex Truck Company, Charlotte, Mich., is increasing the number of employees and adding machinery to speed up production.

The Jackson Fence Company, manufacturer of wire fences, has increased its capital stock from \$120,000 to \$250,000.

The Cushion Steel Spring Company, Mt. Clemens, Mich., has changed its name to the Superior Steel Spring Company and increased its capital stock from \$75,000 to \$140,000.

The Perfection Coil Spring Company, Jackson, Mich., has increased its capital stock from \$20,000 to \$100,000.

The Ralph B. Hunter Company, Detroit, has been incorporated for \$2,500 to manufacture machinery, machinists' tools, etc. The stockholders are Ralph B. Hunter, Louis Lowenstein and Eileen Martin.

The Detroit Valve & Fittings Company and the Detroit Brass Works, Detroit, have been consolidated with an authorized capital of \$1,500,000. The following officers have been elected: President, E. B. Whidcomb; vice-president, O. F. Benjamin; treasurer, A. L. Hanses; secretary, F. L. Uhl.

The Motors Products Corporation, Detroit, has issued a \$1,000,000 note to create a fund for the purchase of the old Lozier plant which the company now occupies.

The Universal Valveless Motor Company has concluded the purchase of a 40-acre tract for a plant at Muskegon, Mich. The company is strongly financed and will start manufacturing on a large scale as soon as the factory is completed.

Cincinnati

CINCINNATI, OHIO, Feb. 19, 1917.

Freight embargoes on shipments East are causing some apprehension on the part of all manufacturers. The situation has not become acute and no cancellations of orders for machine tools have been received. As the majority of foreign contracts are not subject to cancellation it is generally believed that no serious developments will occur. The domestic demand for machine tools from the railroads and motor car manufacturers is improving at such a rate that even if foreign shipments have to be diverted there is enough business in this country to take up the slack. A call for metal-forming machinery has lately developed and makers of this class of equipment are very busy.

The Joseph Joseph & Brothers Company, Cincinnati, scrap iron merchants, has let contract for a warehouse addition, 40 x 80 ft., two stories, of mill construction.

The Cincinnati Iron & Steel Company, Cincinnati, intends to make further additions to its plant at Fifth and Baymiller streets. The latest plans are for two warehouse buildings, 100 x 200 ft., one story, of steel construction. Traveling cranes will be installed in both buildings. James I. Stephenson is president.

Tietig & Lee, architects, Cincinnati, have been commissioned by the Newport Rolling Mill Company, Newport, Ky., to prepare plans for an addition to its machine and blacksmith shop, 50 x 200 ft., of steel construction.

The J. H. Day Company, Cincinnati, maker of bakers' machinery and other special equipment, has increased its capital stock from \$100,000 to \$150,000 and will increase the capacity of its plant.

The John Douglas Company, Cincinnati, maker of plumbing equipment, intends to add sufficient kilns to double the capacity of its plant in West End.

Additional details received from the W. E. Lamneck Company, Columbus, Ohio, maker of furnaces and furnace fittings, are that the main building planned will be 120 x 135, two stories, of reinforced concrete construction. Nearly all of the necessary equipment has been purchased.

The Davis Sewing Machine Company, Dayton, Ohio, has under cover additions to its forging plant and installment of equipment will be under way within a few days.

The Cleveland Brick Machinery Company, Wickliffe, Ohio, wants immediately a 50-ft. second-hand 8 or 10-in. roller conveyor.

The National Products Company, East Liverpool, Ohio, is in the market for a 10 or 15-ton electric traveling crane for 60 to 75 ft. span to operate on a 220-volt direct current.

Milwaukee

MILWAUKEE, WIS., Feb. 19, 1917.

Industrial activity has been resumed after a short period of quiet, in spite of the deterring effect of the worst traffic situation ever known. The demands upon manufacturers are increasing at so rapid a rate that enlargement of facilities is absolutely imperative, notwithstanding the high cost of materials. Machine-tool builders report they are overwhelmed with orders, but have been able to make some headway in catching up on deliveries by a slight improvement in the freight situation. Orders generally are for single tools or small lots, buyers recognizing the fact that large-lot requirements can hardly be placed at this time with any degree of satisfaction with respect to early delivery.

The water and light commission, New London, Wis., will purchase an additional 200-hp. boiler for the power plant.

Oconomowoc, Wis., will receive bids until 2 p. m., March 1, for furnishing one uniflow engine, direct-connected to a 250-kw., two-phase, sixty-cycle, 2300-volt generator and exciter, and one 1000-hp. feed water heater for the municipal electric light plant. Alfred Hanson is city clerk.

The Peck Hardware Mfg. Company, Berlin, Wis., has decided to retire from business on or about March 1 because of the lack of adequate working capital. Fred R. Peck is president. Thomas Wood, factory manager, will become associated with the Robbins Mfg. Company, Chicago.

Henry Clark and John Youness, New Richmond, Wis., have formed a partnership and will establish a general sheet metal-working shop, now being equipped.

The Plumbers' Wood Work Company, Algoma, Wis., is increasing the capacity of its foundry department and will install a molding machine.

The Union Grove Electric Light & Water Company, Union Grove, Wis., sustained practically a total loss, amounting to \$12,500, by the destruction of its power plant by explosion. The plant contained two oil-burning engines, generators and storage battery system. It is owned by William Hardy, who probably will rebuild at once.

The Simple Gas Engine Company, Ashland, Wis., has decided to move its business and headquarters to Menasha, Wis., where a new plant costing about \$20,000 will be erected at once. Only a small list of new equipment will be purchased.

The Clark Carriage Company, Oshkosh, Wis., is being reorganized and some new equipment will be purchased for the manufacture of metal and wood automobile and truck bodies. H. M. Foulke will continue as general manager.

The Leicht & Petri Company, Two Rivers, Wis., succeeds the Thill, Leicht & Petri Company, John Thill having sold his interest in the sheet metal and tinware manufacturing business to his partners.

The Plymouth Foundry & Machine Company, Plymouth, Wis., is preparing to build a new foundry unit, 60 x 150 ft., to cost about \$25,000. Klug & Smith, consulting engineers, 40 Mack Block, Milwaukee, will take bids about March 1.

The Wisconsin-Minnesota Resilient Steel Wheel Company, Waukesha, Wis., has been incorporated with a capital stock of \$100,000 by J. E. Thomas, George F. Wahrer and John F. Buckley.

The Slater, Marsden & Whittemore Company, Beloit, Wis., operating a general machine shop, has changed its corporate style to the Hendley & Whittemore Company. The Slater and Marsden interests were purchased by T. C. Hendley in April, 1913. The company is installing considerable new equipment.

The Hayes Machine Company, Oshkosh, Wis., has established a department for the manufacture of automobile and motor truck axles.

The Osborne Casting Company, Racine, Wis., which recently established a foundry, has incorporated its business under the same style. The initial capital is \$1,000 and the incorporators are John H. Osborne, Charles Holmes and F. L. Osborne.

The Terwedo Mfg. Company, Oshkosh, Wis., has engaged in the production of automobile, truck and tractor radiators and cooling systems.

The P. B. Yates Machine Company, Beloit, Wis., will start operations in its new shop additions Feb. 20, thereby increasing its output of wood-working machinery and tools approximately two-fold.

The Fond du Lac Church Furniture Company, Fond du Lac, Wis., has increased its capital stock from \$150,000 to \$300,000 to care for the expansion of its business. The Sanitary Refrigerator Company recently was formed by the owners of the Church Furniture Company, and capitalized at \$200,000 and is about to start operations in a new four-story factory, 96 x 108 ft. William Mauthe is president and general manager of both companies.

The Neenah Brass Works, Neenah, Wis., has increased its

capital stock from \$10,000 to \$20,000 to accommodate extensions of the foundry and the growth of its business.

The Allis Mfg. Company, 198-204 Milwaukee Street, Milwaukee, has amended its corporate articles to manufacture electric and other machinery. It now operates a brass foundry and manufactures automatic fire extinguisher systems. William W. Allis is president.

The Bokolt Mfg. Company, Stevens Point, Wis., has been incorporated with a capital stock of \$200,000 by John J. Bokolt, who has been manufacturing steel-shod automobile tire protectors for some time and now will greatly increase the capacity. The new company will occupy the factory vacated by the Automatic Cradle Mfg. Company, which has built a new plant.

The Winther Motor Truck Company, Kenosha, Wis., incorporated some time ago with \$300,000 capital to manufacture automobile trucks and tractors, is preparing to break ground for the first unit of its plant, of reinforced concrete and brick, 110 x 400 ft., with sawtooth roof. M. P. Winther is president and general manager.

The National Paper Can Company of Milwaukee has been incorporated in Delaware with a capital stock of \$550,000. A plant is being established at 576-598 Clinton Street, Milwaukee, to manufacture a combination tin and paper can package. Lewis C. Brooks is president and general manager. Charles W. Paeschke, of the Geuder-Paeschke-Frey Company, Milwaukee, is vice-president.

The Pfister & Vogel Leather Company, Milwaukee, has increased its capital stock from \$9,000,000 to \$12,000,000. It recently purchased the defunct Herman Zehrlaut Leather Company's plant, valued at \$350,000, and is overhauling it and installing much new equipment.

The Olson & Pauly Automobile Company, 441 Jackson Street, Milwaukee, will take bids after Feb. 24 for the erection of its two story and basement, garage and repair shop, 60 x 120 ft., near Wisconsin Street, to cost \$35,000. Frank E. Gray is architect.

The Ton-A-Ford Truck Company, Racine, Wis., has leased the former plant of the Perfex Radiator Company, Racine, and is converting it into a factory for the production of motor trucks built around Ford chassis, with a capacity of 25 to 30 daily. George Beardsley is general manager.

The Mitchell Motors Company, Racine, Wis., has under way large additions to its plant, particularly machine shop and body building. A considerable increase in the production of the company is contemplated for the ensuing year.

The Central South

LOUISVILLE, KY., Feb. 19, 1917.

Freight embargoes are causes of considerable apprehension on the part of the iron, steel and machinery trade of Louisville. Supplies incoming, however, coal especially, have been somewhat easier. All industrial concerns in this section have been feeling the effect of the freight situation. The local utility company has served notice to industrial gas consumers that present contracts, expiring through the summer, will not be renewed on expiration, due to the increased domestic demand.

The Lincoln Machine Company, Louisville, Ky., has been incorporated with capital stock of \$1,000 by Conrad Ahart, James A. Speed and William Barnes.

The Ohio Falls Iron Company, New Albany, Ind., is installing a Belgian roll, with a 9-in. train and making other improvements which will add to its capacity.

H. J. Miller, of H. J. Miller & Co., Seattle, Wash., has purchased the plant of the Cloverport Boat & Mfg. Co., Cloverport, Ky., for \$2,601.

The United States Cabinet Mfg. Co., Carrollton, Ky., has been incorporated with capital stock of \$24,000 by J. F. Jett, James Gayle, C. P. Scott and Wyatt Sebree, and will establish a plant.

Fire on Feb. 16 destroyed the tipple and washer of the Hignite Coal Company, Middlesboro, Ky., with a loss of \$30,000. The company will make temporary replacements and later rebuild.

The Cortrim Lumber Company, Bristol, Tenn., has re-equipped the plants of the Morton-Lewis-Wiley and Peter-McCain lumber companies and will begin operations, proposing additional extensions. George M. Speigle, Philadelphia, Pa., is president.

The Grismore-Hyman Company, Memphis, Tenn., is asking for prices on second-hand boilers and dry-kiln outfitts for slack barrel manufacture. It also contemplates establishing an ice-manufacturing plant.

The Memphis Cotton Cleaner Company, Memphis, Tenn., has been incorporated with a capital of \$25,000 by Henry Goodman, James G. Dickson and others, and will build and operate cotton gins.

St. Louis

ST. LOUIS, Mo., Feb. 19, 1917.

Cautious buying continues in this machine-tool market and is accentuated by railroad embargoes, which are seriously affecting the situation in all lines. Dealers report a very apparent need for equipment, but a decided indisposition to enter into contracts in view of the uncertain deliveries. Industrial needs are quite general.

The Lightfoot Steel Corporation, M. D. Lightfoot, president, Springfield, Mo., advises that it is in the market for one power press similar to a No. 21 Bliss machine; one $\frac{3}{4}$ -in. ball-bearing upright drill; six Lincoln type plain millers with pan and pump; two automatic feed plain millers; one riveting machine; one automatic $\frac{1}{2}$ -in. multiple spindle screw machine; one 12-in. combination buffer and grinder; one tumbling barrel, 24 x 48 in.; one quick-change gear lathe with three-step cone, 14 x 6 ft.; one turning lathe, 16 x 6 ft.; one case-hardening furnace; one vertical milling machine for continuous milling; one intermittent milling machine with milling jigs and fixtures. The company is desirous of securing prices at once.

Maj. J. R. Slattery, in charge of the U. S. Engineer's office for the Third Mississippi River district, Vicksburg, Miss., has announced that the chief of engineers has authorized the construction of a new machine shop at the government fleet and that work of construction will be started at once.

The Kansas City Bolt & Nut Company, Kansas City, Mo., will purchase one $\frac{1}{4}$ -in. Acme heading machine in good condition.

The General Lighting & Supply Company, St. Louis, has been incorporated with a capital stock of \$50,000 by J. D., M. M. and Joseph Cohen.

The New Process Oil Refining Company, St. Louis, has been incorporated with a capital stock of \$10,000 by William Muller, C. A. Moorman and A. B. Kammann.

The Kansas City Light & Power Company, Kansas City, Mo., John H. Lucas, president, has given instructions for the preparation of plans for a new generating station involving a cost of from \$3,000,000 to \$5,000,000.

Webb City, Mo., has plans for the equipment of an electric light and also an ice-making plant to cost about \$50,000. George Crocker and B. D. Reynolds are in charge.

The Lindley-Buster Produce Company, Bucklin, Mo., will equip a refrigerating plant to cost about \$20,000, including ice-making machinery.

The Dew Drop Mining Company, Springfield, Mo., Union National Bank Building, W. F. Plummer, manager, is receiving bids on one 125-hp. Corliss engine, one steam-driven air compressor, an air receiver, a feed water heater of 300 hp. capacity, a boiler feed pump, two 150-hp. boilers, etc.

The Argenta Gin Company, Argenta, Ark., has been incorporated with a capital stock of \$15,000 by W. L. Morrison, T. F. Hutchinson and B. H. Burke.

The Hagarville Gin Company, Hagarville, Ark., has been incorporated with a capital stock of \$14,000 by J. S. Garner, M. C. Lankford and P. H. Garner.

The Coal District Power Company, Fort Smith, Ark., has been incorporated with a capital stock of \$120,000 by Hugh Means, Lawrence, Kan.; G. W. Skow, Greenwood, Ark., and others to equip an electric light service in Sebastian County. It will also acquire some existing plants and remodel them.

The Southern Broom Company, Fort Smith, Ark., will equip a broom factory and install about \$4,000 worth of machinery.

The plant of the Truman Cooperage Company, Truman, Ark., has been burned with a loss of about \$125,000.

Haskell, Okla., will equip an electric light and power plant under the supervision of A. H. Jones, mechanical engineer, to include two 150-hp. engines, two 75-kw. alternating current generators, etc., to cost about \$20,000.

The Night & Day Oil Company, Lawton, Okla., will rebuild its power plant and oil-pumping station, recently destroyed with a machinery loss of \$12,500.

The State of Oklahoma has plans for the installation of an electric light and power plant in the new State Capitol to cost about \$187,000 for machinery and accessories. M. L. Cunningham, State highway engineer, Oklahoma City, is in charge.

The Globe & Refining Company, Enid, Okla., has been incorporated with a capital stock of \$500,000 by D. S. Smithisler and Guy S. Manatt and others.

The Roanoke Mining Company, Commerce, Okla., E. M. Funkhouser and others interested, will receive bids for two 150-hp. boilers and other machinery.

Sumrall, Miss., J. I. Brueck, city clerk, will receive bids on equipment for a water-works plant, including oil engines,

pumping machinery, etc. Xavier A. Kramer, Magnolia, Miss., is the engineer.

The Public Service Commission, Yazoo City, Miss., will purchase generators and other equipment for an electric light plant to cost about \$20,000.

Monroe, La., will equip a filtration plant, reconstruct its waterworks and electric light and power plants, expending about \$250,000.

The J. W. Sanders Foundry & Machine Company will erect a foundry at DeRidder, La., in the near future to cost \$25,000. J. W. Sanders, Shreveport, is president.

Birmingham

BIRMINGHAM, ALA., Feb. 19, 1917.

Mining equipment is unusually active. Steam as well as electric appliances are in demand from collieries, graphite and other new mining plants. Gasoline engines cannot be supplied in quantity desired in the agricultural field. The remarkably active business of January continues.

The Irondale Foundry & Machine Shop, Berman's Lane, has been incorporated by J. P. Beggs, Claud Fortenberry and others with a capital stock of \$10,000 and will build a plant to manufacture sash weights.

Beaufort, N. C., has voted \$100,000 of bonds for waterworks and sewers.

The Blue Springs Power Company, Marianna, Fla., incorporated with a capital stock of \$50,000, proposes to operate a hydroelectric plant. S. V. Hough, Gretna, Fla., is president.

The United Furnace Company, Savannah, Ga., has been incorporated with a capital stock of \$50,000 by John G. Struck and Otto Van Campen.

Texas

AUSTIN, TEXAS, Feb. 19, 1917.

The Markham Irrigation Company, recently organized with a capital stock of \$50,000, will install additional machinery in its pumping plant at its irrigation system at Bay City.

Thomas C. Ruddy, El Paso, and associates, plan to build a meat-packing plant at Fort Worth to cost about \$1,500,000.

Judge Edward R. Meek of the United States District Court has granted the application of C. F. Schaff, receiver of the Missouri, Kansas & Texas Railroad Company, to borrow \$3,000,000, which will be used in making improvements to its lines in Texas, including the building of new shops.

The Gulf Public Service Company, Atlanta, capitalized at \$125,000, will construct electric light and waterworks plants at Atlanta, Bloomberg, Queen City and Orange. The stockholders are Edward S. Ellis, McAlester, Okla., J. C. Connelly, Port Arthur, and O. C. Oden, Atlanta.

M. M. Counselman, Wallace, Idaho, plans to install a plant at El Paso for the manufacture of wrenches and other small tools. The proposed factory will employ from 700 to 1000 men.

The El Paso Sash Door Company, El Paso, will rebuild its planing mill, recently destroyed by fire. The new plant, it is stated, will cost about \$200,000.

W. A. Squires, Wichita Falls, and associates, plan to build a cotton mill at El Paso to cost approximately \$1,500,000.

The Harry A. Miller Mfg. Company, Los Angeles, Cal., is negotiating with the Chamber of Commerce, Austin, with the view of installing a plant to cost \$325,000 for the manufacture of automobile carburetors. The manufacture of a specially designed motor is also contemplated.

San Francisco

SAN FRANCISCO, CAL., Feb. 13, 1917.

A considerable improvement has taken place since Feb. 1 in the demand for machine-tool parts and for small additions to plants. This is particularly true of the interior sections. Better weather with improved road conditions and a general acceptance of the higher prices seem to have brought out a good deal of small work that had been held back. The shipbuilding plants are rushed and are in the market to a certain extent all the time. Numerous inquiries are coming in from garages and automobile repair shops, in some cases for complete installations. The dry weather has led to an increased demand for gasoline engines for irrigation and general farm use. The Orient is buying freely of miscellaneous machinery, but cargo requirements are such that most of these orders

will have to be shipped from Seattle, though some orders for Hawaii and the Philippines will go from San Francisco.

The entire machinery equipment of the James Robertson shipyard at Benicia, Cal., was destroyed by fire last week with an estimated loss of approximately \$10,000.

Plans have been completed for the two-story brick and steel shop and office building of the General Machinery Company, Ecker Street near Mission Street, San Francisco.

Development work that will involve the expenditure of nearly \$500,000 is being planned by the Shell Refinery at Martinez, Cal. Work on Trumble Unit No. 3 will be begun March 1 and as soon as possible another unit will be added to the asphalt plant.

Milbery & Brown, Inc., Reno, Nev., has been incorporated by L. A. Brown, C. A. Milbery and S. H. Rosenthal with a capital stock of \$20,000 and will build a garage and machine shop.

Charles R. McCormick & Co., Eureka, Cal., owners of the shipbuilding plant at St. Helens, are considering the erection of a complete machine shop.

The Ore-Panning Machinery Company, Reno, Nev., capitalized at \$200,000, has been incorporated by Edward Donlan, E. M. Ferguson, G. P. Smith, C. C. Virgil, F. E. Brewer and E. Cohen.

The San Diego Consolidated Gas & Electric Company, San Diego, Cal., which recently purchased the power plant at Escondido, Cal., is planning to expend about \$25,000 for machinery and improvements.

Effective Feb. 1, 1917, the Union Tool Company of Los Angeles and Torrance, Cal., took over the operation of the entire plant of the Pacific Metal Products Company, manufacturer of steel barrels and drums, screw machine products and steel cap screws at Torrance, and will continue the manufacture of products as heretofore. Unfilled orders and contracts from that date will be executed by the Union Tool Company. Future purchases of material used in manufacture will also be made by them and correspondence covering these matters should be addressed to them at Torrance. All invoices and accounts for goods shipped prior to Feb. 1 will be settled for with the Pacific Metal Products Company. Settlements for purchases made prior to this date will also be made by them.

The Pacific Northwest

SEATTLE, WASH., Feb. 13, 1917.

The mills of the West Coast Lumbermen's Association now have approximately 15,000 carloads of unshipped orders for future transcontinental delivery, and the unshipped balance continues to pile up. Car shortage is particularly severe at present, and mills generally are not disposed to accept a great deal of additional business until the future shipping situation is more definitely determined. A considerable number of mills are now closed down on account of the car shortage, scarcity of logs and local weather conditions. Production for the past week shows a curtailment of 33.08 per cent.

Statistics relating to foreign trade for the Port of Seattle show that business amounting to \$257,445,403 was done in the year 1916, more than double the record for 1915. The port's foreign imports, amounting to \$161,329,789, doubled the figure for 1915, while the exports, \$96,115,614, trebled the figure for 1915. Seattle's total foreign commerce for 1916 amounted to \$412,438,319.

The Dallas Iron Works, Dallas, Ore., was recently sold to Joe Glatz of that place. He plans to move the plant to the southern part of the city and will remodel it.

The American Packing Company, Everett, Wash., will begin work on an addition to its plant for the manufacture of tin cans.

The Miller-Parker Company, Oregon City, Ore., plans the erection of a three-story repair and machine shop to cost \$20,000.

G. D. Largely and B. G. Melhart, Puyallup, Wash., will construct a factory to manufacture a patent metal clothespin and new type of clothesline.

The Spokane, Portland & Seattle Railway, Portland, Ore., plans the expenditure of more than \$1,000,000 in 1917 in improvements to its lines and service.

H. W. Moore & Co., Denver, Col., manufacturers and jobbers of road machinery, have opened a wholesale distributing house in Billings, Mont., in charge of H. R. Coddington.

The Port of Astoria, Ore., will erect four grain storage elevators, to have capacity of 500,000 bu. of grain. It is also receiving bids for dredging machinery.

The Pacific Steel & Boiler Company, Tacoma, Wash., plans extensions and improvements to cost \$50,000 that will practically double the size of its present plant.

The Layton Cooperage Company, Portland, Ore., plans the construction of a three-story cooperage plant, 50 x 100 ft., at 327 Water Street, to cost \$10,000.

The Port of Seattle Commission, Chief Engineer Nicholson, will buy equipment for an addition to the public grain elevator, including a 50-hp. steam boiler, belt conveyor, etc.

The Standifer-Clarkson Shipbuilding Company, Portland, Ore., recently received contract for another wooden vessel for the Inter-ocean Trading Company, San Francisco.

The Doty Lumber & Shingle Company, Centralia, Wash., plans the installation of a 600-hp. engine in its plant.

The Bend Brick & Lumber Company, Bend, Ore., plans improvements to double its capacity, giving it a production of 1,000,000 brick per month.

Johnson Porter, of the firm of Porter Brothers, general contractors, Eugene, Ore., is head of a movement to construct a shipbuilding plant at Florence, Ore. The firm will invest \$150,000 in the enterprise, the remaining \$50,000 to be raised by the cities of Eugene and Florence.

Canada

TORONTO, ONT., Feb. 19, 1917.

The British North American Hydro Electric Power Company, Winnipeg, Man., has made surveys and proposes to spend several million dollars in power development in Manitoba. Charles Chamberlain is president.

The factory of the Allith Mfg. Company, 47 Bay North, Hamilton, Ont., manufacturer of hardware specialties, was destroyed by fire with a loss of \$25,000, including a quantity of machinery. It is reported that the plant will be rebuilt.

The plant owned by the Kelsey Wheel Company, Windsor, Ont., was damaged by fire with a total loss of \$10,000.

The London & Port Stanley Railway Board, London, Ont., will be in the market shortly for a work car to be completely equipped for line work on its electric railway at a cost of \$25,000.

The Hydro Electric Commission, 15 Wilton Avenue, Toronto, will receive bids until Feb. 28 for synchronous condensers. F. A. Gaby, University Avenue, is engineer.

The Canadian Oil Products Company, Oil Springs, Ont., will replace its oil-pumping machinery recently destroyed by fire with a loss of \$5,000.

The Town Council, Strathroy, Ont., will shortly be in the market for a motor-driven turbine pump to cost \$5,000. A. R. Smithnun is town engineer.

The Dominion Cutlery Company, Ltd., Montreal, has leased two three-story buildings at Westport, Ont., in which it will install equipment for turning out drop forgings, knives, scissors, coffin trimmings, etc. The company was recently incorporated with a capital stock of \$1,000,000.

Sudbury, Ont., proposes to spend \$7,000 on extensions to its power plant. W. J. Ross is clerk.

V. O. Phillips & Sons, Kitchener, Ont., will build an addition, 60 x 100 ft., to the plant of the Twin City Oil Company, Kitchener, for the purpose of manufacturing a visible gasoline pump, of which they have purchased the Canadian rights.

Sherbrooke, Que., is contemplating the purchase of Two Miles Falls at Weedon, Que., and the establishment there of plants for developing electric energy at an estimated cost of \$1,500,000. Francis & Co., Montreal, are the consulting engineers.

The premises of the Annawt Machine & Tool Company, 105 Adelaide Street West, Toronto, were damaged by fire Feb. 13 with a loss of \$2,300.

The Ontario Hydro Electric Power Commission, Toronto, will spend \$2,500,000 on power development at Port Arthur, Ont. F. A. Gaby is the engineer.

The Channel Chemical Company's plant at 369 Sorauren Avenue, Toronto, recently damaged by fire with a loss of \$35,000, will be rebuilt.

The Crow Motor Car Company, Mount Brydges, Ont., is making preparations for the erection of a plant to cost \$100,000. A. Eisenbach is manager. The new plant is to be erected at London, Ont.

As the first step toward establishing their shipbuilding plant at Vancouver, B. C., John Coughlan & Sons have recently taken out a permit for the erection of a machine shop and mold loft at False Creek, B. C.

The Maritime Motor Company, Vancouver, B. C., has recently established a plant there to manufacture a gasoline driven mining and logging locomotive. The Dominion Safe Works has also secured a site on the industrial land at Vancouver, B. C., and will shortly erect a plant there.

Repair shops for engines and cars of the Great Northern and the Northern Pacific railroads will be constructed in con-

nection with the new depot which is being erected at False Creek, Vancouver, B. C. The station will be completed early in May.

Harbor improvements to cost \$1,000,000 will be made at Victoria, B. C., by the Department of Public Works, Ottawa.

The Preston Car & Coach Company, Preston, Ont., is making preparations for rebuilding its plant, recently destroyed by fire. It will cost \$75,000. D. M. Campbell is manager.

The Ford Motor Company proposes to make additions to its assembly plant at Saskatoon, Sask. H. R. Cottingham is local manager.

The Richardson Grain Separator Company, Minneapolis, Minn., has purchased a site on Winnipeg Avenue and Myrtle Street, Winnipeg, Man., and will erect a plant.

The Middlesex Mills Company, Dundas Street, London, Ont., is having plans prepared for a one-story brick boiler house to cost \$10,000.

The Maritime Coal, Railway & Power Company, ChigNECTO, N. S., proposes to purchase electric pumps, motors, etc., for its plant. R. J. Bell is general manager.

The T. F. Shurly Company, Ltd., St. Catharines, Ont., has been incorporated with a capital stock of \$200,000 by Theodore F. Shurly and others to manufacture knives, axes, saws, etc.

The Standard Steel & Tempering Company, Ltd., Montreal, has been incorporated with a capital stock of \$50,000 by Louis A. David, S. H. R. Bush, Benjamin Robinson and others.

The Baynes Carriage Company, Ltd., Brantford, Ont., has been incorporated with a capital stock of \$50,000 by James Harley, Edmund Sweet, Archibald M. Harley and others.

Government Purchases

WASHINGTON, D. C., Feb. 19, 1917.

The general purchasing officer of the Panama Canal, Washington, will receive sealed proposals until 10:30 a. m. March 6, under circular 1123, for shop machines.

Bids will be received (date not set) by the Bureau of Supplies and Accounts, Navy Department, Washington, Schedule 751, for two steam hammers for Boston; schedules 766 and 767 for 12 air condenser and feed pumps and schedule 767 for four lubricating oil pumps, all for Mare Island; schedule 770 for one vertical milling machine for Washington.

Bids were received by the Bureau of Supplies and Accounts, Navy Department, Washington, Feb. 13, for supplies for the naval service, as follows:

Ordnance

Class 106, Washington—Two 12-in. motor-driven lathes—Bid 90, \$2,042; 98, \$1,539, \$1,558, \$1,658, and \$1,425; 110, \$895.66; 111, \$1,855; 138, \$1,941.

Class 107, Washington—Two 16-in. motor-driven lathes—Bid 3, \$2,216.90; 61, \$2,148; 90, \$2,259; 98, \$2,740 and \$2,800; 111, \$2,605; 8, \$2,335 and \$2,275; 138, \$2,415.

Class 108, Washington—One screw machine—Bid 61, \$468 and \$585; 98, \$675; 100, \$450; 172, \$663 and \$778.

Class 109, Washington—One sensitive drill press—Bid 90, \$820; 92, \$692; 98, \$635, \$660, and \$685; 8, \$577, \$650, and \$553; 138, \$597 and \$727; 184, \$692.

Class 110, Washington—One vertical milling machine—Bid 90, \$3,100; 98, \$3,106, \$3,225, and \$3,095; 8, \$2,965 and \$3,000; 184, \$2,855.

Class 111, Washington—One vertical drilling machine, 30 in.—Bid 61, \$688; 90, \$1,117 and \$1,035; 98, \$873, \$940 and \$1,015; 111, \$760; 8, \$626, \$717, \$663, \$748, and \$605.

The following bids were received by the chief signal officer, War Department, Washington, Feb. 8, under signal proposal 911, for furnishing machine tools. Other bids were received for testing equipment.

2. One No. 112½ Bliss rotary slitting shear for ¼-in. soft steel or iron—Bid 98, \$1,725, motor \$275; 6, \$2,037; 7, \$2,065.

3. One sliding table and ways for above slitting shear—Bid 5, \$890; 6, \$890; 7, \$890; 8, \$890; 9, \$934.50.

4. One Oxygraph proper—Bid 15, \$600.

5. One set of No. 1 Johansson combination standard gages—Bid 7, \$864.

6. One No. 245 Stiles 48-in. power squaring shear—Bid 98, \$950, motor \$155; 5, \$1,130, \$1,135, and \$1,140; 6, \$1,058; 7, \$1,105; 8, \$1,160 and \$980; 9, \$1,152.50.

7. One 20-in. Whitney wet tool grinder, with countershaft and water attachment—Bid 111, \$175; 98, \$95, motor, \$115; 61, \$245; 7, \$227; 8, \$192 and \$173.

8. One No. 1 Racine high-speed metal-cutting machine—Bid 111, \$190; 98, \$190; 61, \$180; 7, \$205; 8, \$188 and \$169; 9, \$212.20; 90, \$175 and \$116; 25, \$190.

10. One 16 x 8-in. Lodge & Shipley screw-cutting engine

lathe—Bid 111, \$1,730; 98, \$1,927, motor, \$115; 61, \$1,670; 4, \$950; 7, \$1,197; 8, \$1,688; 90, \$1,467 and \$1,059; 3, \$1,709.50.

11. One 16-in. x 8 ft. Blount patternmakers' speed lathe—Bid 111, \$345; 98, \$257, motor, \$66; 61, \$268, motor, \$57; 4, \$569; 7, \$275.90; 8, \$270; 9, \$325.25; 90, \$449; 11, \$450.50 and \$474.50.

12. One 15-in. Universal shaping machine—Bid 98, \$520, motor, \$95 plus \$458 for attachments; 6, \$517.25, motor, \$569.25; 7, \$760; 8, \$650; 90, \$1,743; 21, \$1,053.

14. One power punch press, No. 1—Bid 5, \$415 and \$400.

19. One Barnes No. 3 drill press, with 21-in. diameter table—Bid 111, \$300; 98, \$216, motor, \$66; 61, \$304, \$328, and \$387; 8, \$310; 90, \$272; 3, \$387.

20. Two sensitive drill presses—Bid 98, \$58, motor, \$44; 61, \$555 and \$242; 8, \$130; 12, \$117.

21. Two metal jig saws—Bid 98, \$294; 8, \$150; 9, \$156.35; 90, \$150; 24, \$663.90 and \$735.90.

22. One No. 145 Toledo electric spot welder—Bid 16, \$2,150.

The names of the bidders and the numbers under which they are designated in the above list are as follows:

Bid 3, Aumen Machinery Company; 4, L. J. Growt (J. A. Fay & Egan Company); 5, E. W. Bliss Company; 6, Carroll Electric Company; 7, Henry Prentiss & Co.; 8, D. Nast Machinery Company; 9, Universal Trading Company; 11, American Woodworking Machinery Company; 12, Hisey-Wolf Machine Company; 15, Davis-Bourbonville Company; 16, W. E. Shipley Machinery Company; 21, Potter & Johnston Machine Company; 24, H. G. Thompson & Sons Company; 25, Racine Tool & Machine Company; 61, Fairbanks Company; 90, Kemp Machinery Company; 92, Leland Gifford Company; 98, Manning, Maxwell & Moore; 110, Master Machine Works; 111, Niles-Bement-Pond Company; 138, Sherritt & Stoer Company; 172, Warner & Swasey Company; 184, Swind Machinery Company.

NEW TRADE PUBLICATIONS

Blocks.—D. Round & Son, Cleveland. Chain block bulletin No. 44. Presents illustrations and brief descriptions of a line of triple-gearied blocks. Tables of the various sizes of triple geared, screw and differential hoists that can be supplied are presented, together with lists of repair parts. An engraving showing the comparative lifting power of the three types of hoists is presented, and several views of the blocks in use are included. Mention is made of a line of winches and I-beam trolleys and a portable crane and hoist.

Steel Products.—Cambria Steel Company, Widener Building, Philadelphia. Booklet. Covers the line of steel and other products manufactured by the Cambria and Midvale Steel companies and the Worth Brothers Company. The list is arranged in alphabetical order, with brief notes where necessary to cover the range of sizes of any particular product or the various shapes and brands. In addition to a complete line of steel products others, such as cinder, coal derivatives, copperas, limestone ballast and screenings and slag, are listed. Mention is made of the various products covered by special catalogs, and a list of sales offices is included.

Tool and Alloy Steels.—Hammond Steel Company, Inc., Syracuse, N. Y. Pamphlet. Relates to a line of tool and alloy steels and their uses. After a brief introduction the various brands are listed with data on their uses and the hardening treatment to be employed. Mention is made of a line of die block steels and other products such as forgings, gear blanks, etc. Suggestions for hardening tool steel, a table of weights and the standard classification of extras are included.

Boiler Tools.—A. L. Henderer's Sons, Wilmington, Del. Catalog No. 11. Gives brief illustrated descriptions of a line of boiler makers' tools, which includes expanders of various types, screw and hydraulic punches, pumps, clamps and jacks. Tables giving the various sizes of each tool that can be supplied are included in a number of cases and drawings showing the different styles of punches and dies that can be furnished are presented.

Melting and Refining Furnaces.—Monarch Engineering & Mfg. Company, Baltimore. Pamphlet. Shows a line of furnaces employing air or gas fuel and low-pressure air for melting and refining brass, copper, bronze, aluminum, nickel, ferroalloys, iron, semi-steel, ores, precious metals, etc., without crucibles. The advantages claimed for this type of furnace are the elimination of crucibles, small floor space, simple construction and low cost of melting. The construction and operation of the furnaces is gone into at some length, the text being supplemented by engravings of the various kinds of furnaces, with tables of dimensions and specifications.

